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## THE PROBLEM OF FORMAL GRAMMAR IN ELEMENTARY EDUCATION.

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On every hand there is evidence of a widely growing distrust of the effectiveness of the present educational systems in this country. More and more the magazines, newspapers, citizens' clubs, research bureaus and other organs of public opinion are concerned with the question, Is education hitting the mark? The answer to this pertinent inquiry of the layman the educator himself cannot give, because he, too, does not know. He can utter platitudes and opinions, but these do not satisfy him and much less the present age. What he desires above all things at the present time is ability, methods, and opportunity for *measuring results*. Such evaluation of the various phases of modern school procedure in the light of some intelligible and satisfactory aim (social efficiency, or Dewey's "essentials of character:" social insight, social responsiveness, and social power) is a primary purpose of a rapidly growing number of men and women devoted to the progress of democracy and education.

The problem of this study is the verification of an investigation by Franklyn S. Hoyt of the functioning of formal grammar in the lives of elementary school children. Mr. Hoyt[1]

[1]See the *Teachers College Record* for November, 1906, "The Place of Grammar in the Elementary School Curriculum."

chose this subject for scientific testing because its place and value in the elementary school curriculum has long been disputed. He did not attempt to decide the question by references to authorities on the science of grammar nor by quotations from noted men as to how much they believed themselves to have been helped by the study of grammar as a separate subject in their youth. He attempted to measure results directly in the children of the public schools, and it is this which makes his study of permanent importance. The need of verification of such investigations requires no discussion here. Huxley long ago expressed the modern point of view in his statement that "the man of science has learned to believe in justification, not by faith, but by verification."

Mr. Hoyt subjected to criticism and to test the five leading arguments for teaching grammar as a separate subject in the elementary schools, namely, that the subject as taught:

a. Disciplines the mind;
b. Prepares the way for the study of other languages;
c. Gives command of an indispensable terminology;
d. Enables one to use better English;
e. Aids in the interpretation of literature.

He dismisses the formal discipline argument because, first, modern research shows that while the spread of training is not entirely mythical, still it is not sufficient to hold a subject in a modern curriculum; second, that grammar as ordinarily taught in the elementary school is abstract, relatively meaningless and beyond the needs and reasoning abilities of children; and, third, that it tends to retard rather than promote the natural development of the child, taking up his time and standing in the way of his progress toward a fair use of English in the few years of his school life; granted, of course, that with exceptional teachers or with exceptional children it may be made "to subserve a vital part in the educational process."

While the "Dogma of Formal Discipline" is, practically, still potent in common thought, and has only been "scotched, not killed," by the experimental psychologist, all will probably agree that it alone does not afford sufficient support to a course in the elementary school.

Abandoning, then, this theoretical argument as unsafe for justifying the subject, the author disposes of the second hypothesis commonly given, namely, that it prepares for the study of other languages, by showing, first, that in the best of cities most children do not enter high schools where other languages are taught, and that the places where they are taught below the high school are very few; second, that English is essentially "a grammarless tongue" so unlike the highly inflected Greek, Latin, German and French languages that its grammar can give little help; and third, that pupils who do enter the high school carry with them, even after two or three years' study of grammar, only a hazy, incomplete knowledge of the subject, insufficient to be of much help for any language.

Here, again, Mr. Hoyt's arguments seem to be sound and based upon well-known facts. The many studies of attendance, retardation, elimination, and the like, which have been made since 1906 seem to bear out his conclusions. We can, at least, tentatively grant so much.

Having disposed of the preparation-for-high-school-work basis for justification, the author likewise refuses to accept the sufficiency of the argument that formal grammar is necessary in the elementary school because it equips the pupil with certain indispensable grammatical terms. He asserts that the indispensable part of the terminology of grammar is limited to a very few terms, much better acquired by actual use in a functional way.

What the author here means may, perhaps, be illustrated by the language work in the Francis Parker School, Chicago, which the writer visited for several days in 1907. No period for grammar was shown on the program for the eighth grade. The teacher of this grade was asked if she taught the pupils grammar, and she replied, "Only as I find it helpful in writing or speaking English. If the pupil misuses adverbs, for example, I may call attention to this type of mistake and use the term, adverb. The pupil generally desires to know at this point what an adverb is, and I tell him." How few of such terms pupils really need should in some such manner be determined. It is not entirely a question of whether grammar when looked at alone may not be of some little value, but a question

of what knowledge is of most worth to the actual boys and girls in the actual public schools and with their actual careers in the actual world today immediately before them.

Whether the arguments thus passed over should also be subjected to experimental proof need not detain us. It is the strength of the two remaining props which concerns us here. Does the study of formal grammar in the elementary school help children very much (d) in the use of correct English and (e) in the interpretation of the language? These are the problems of the Indianapolis investigation and the Minneapolis verification.

## The Investigation.

The reasoning of the Hoyt inquiry is substantially as follows: If the study of formal grammar helps pupils to *use* correct English, for example, then, in general, pupils having a good knowledge of grammar should be found to excel in the correct use of the language, and *vice versa*. That is, with careful tests and large numbers of children there should be found some significant degree of correlation between the two sets of ratings. This is all the more certain when we remember that strong students are frequently strong in several subjects and weak pupils are frequently poor in several subjects. How large the latter correlation is in general we do not at present know. Perhaps much of the small correlation found by both investigations can be accounted for on this basis. At any rate, the method of thinking is the same as that involved in finding the relationships between any two large groups of phenomena. If we wish to know, for instance, if there is any relationship, probably causal, between children's absence from school (through sickness or other causes) and their failure of promotion, we can determine it by seeing how generally *absence* is correlated with *failure* and whether the number of cases of the latter increases with the former. If, in general, *all* children who miss school over five weeks in a term fail of promotion, we should have a correlation of 100 per cent., or 1. A correlation of 50 per cent., or .5, would show a fair connection between the two phenomena, while one as low as 10 per cent., or .1, would be relatively insignificant in this case. In each

case it is necessary to take large numbers of children in various schools in order to eliminate as far as possible other causal factors.

Mr. Hoyt carefully prepared three examinations, one in grammar, one in composition, and one in interpretation, which were given to two hundred Indianapolis high school pupils who had but a few months before completed the work of the elementary schools.[2] The papers were carefully graded by two expert markers and correlations made according to the Pearson formula, with the following results:

| | A's marks. | B's marks. | A's and B's combined. | Average of A's and B's correlation. | Probable true correlation. |
|---|---|---|---|---|---|
| Grammar and composition..... | .12 | .23 | .23 | .18 | .30 |
| Grammar and interpretation..... | .22 | .19 | .28 | .21 | .35 |
| Interpretation and composition.... | .27 | .30 | .32 | .28 | .41 |

These rather generously estimated "probable true correlations" the author asserts are "not sufficiently great to lead us to believe that knowledge of, or proficiency in, one of them depends upon, or is materially influenced by, a similar attainment in either of the other abilities," thus vindicating to some extent, also, the stand made with reference to the disciplinary value of grammar.

More light is thrown upon these low correlations when we compare them with correlations made between the ratings for different subjects in college entrance examinations and elsewhere, as given in Thorndike's "Educational Psychology" (1902 edition) and Mr. Hoyt's thesis. Higher correlations are found between totally different subjects than between grammar and these two abilities. A student with a given grade in grammar is more likely to have a similar grade in history, for example, than he is to have a similar grade in composition or interpretation. Where possible, future tests of these relationships may well take in correlations between grammar and the students' actual ratings on examination in other subjects. These were not undertaken in this investigation nor in the verification.

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[2]For directions and examinations see appendix of this article.

## The Verification.

It has been necessary to give much space to the original Hoyt investigation in order to show what has been tested. The careful investigator today publishes not only the results of his inquiry, but gives also the methods he has used and his original data so far as possible. The later student of the problem may recompute the original investigation from the data or he may follow the same method to see if the same results are obtained. The writer has verified the computations, but he could not easily obtain the original examination papers, and the latter precaution is probably not necessary. No other conclusions seem to be derivable from the figures given, although the data may be used, of course, for various purposes. The method of verification was to follow carefully the exact method used by Mr. Hoyt, taking only a different group of children. The pupils he tested were beginning high school pupils in Indianapolis; those tested for the verification were beginning high school pupils of Minneapolis.[3]

It was not thought necessary to have the papers marked by two persons, working independently, in the case of the verification. Independent marks were made of twenty papers in each subject, and these corresponded so closely to the marks already given by the investigator that the second marking was abandoned. The expense and labor seemed too great for the extra accuracy. No marks were put on the papers; they were kept on separate sheets for each subject and all the papers for a single subject were graded at a time. The names were unfamiliar to the writer and no attention was paid to the general correspondence of the marks for any pupil in the various subjects.

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[3]The second tests were given in the East and Central high schools of Minneapolis through the kindness of Principals W. F. Webster and John Greer, respectively, on the same day, in the month of February, 1907. The pupils were from 40 different elementary schools and showed good, average knowledge of the subjects in which they were tested. They had entered the high schools in the middle of the school year, about January 20.

The results, as given below, are a surprising proof of the accuracy of Mr. Hoyt's correlations:

| | | |
|---|---|---|
| Correlation of grammar and composition ..... | .23. | Probable true C. not over .3 |
| Correlation of grammar and interpretation .... | .10. | Probable true C. not over .2 |
| Correlation of composition and interpretation.. | .24. | Probable true C. not over .3 |

They show that there is very little connection between the results by subjects of these examinations of these pupils, with the probability that there is little connection between *all* that is gained from any two of these subjects as now taught and for children in general of the same grade. Other tests and other methods should be used to carry the matter to relative finality.

For those who wish further to verify the conclusions there are given in the appendix, also, the marks which the pupils received in each subject. They are given as deviations from the stated medians in order to save labor for any who wish to use them. The actual marks can easily be obtained by adding the deviation to the median for the subject.

## Conclusions.

These two tests and the careful consideration of the other values thought to exist in the teaching of formal grammar to elementary pupils seem to take away much of the support the subject now has. A fact remarkable to the writer has been the readiness with which schoolmen generally endorse the conclusion that formal grammar is of little value to elementary pupils, while the subject nevertheless remains relatively unchanged, often beginning in the fourth or fifth grades of the elementary curriculum. With the great demand made on the elementary school in our present-day, changing, industrial democracy, it is no longer admissible for a subject to remain in the curriculum for no other reason than tradition and inertia. With the whole range of vocational, hygienic, and socializing training needed by our "nation of sixth graders," and with the curriculum now overcrowded, we need an immediate further evaluation of this subject and a speedy adjustment to the conclusion.

We need to relieve ourselves of the stigma put upon us by Professor Beard (true also for the university in which he works, of course) that American educators have great courage

in adding new subjects to the curriculum, but very little in modifying or eliminating the old ones. We cannot depend upon reports of committees of five or fifty to settle such matters. The only sure avenue will be through the laborious testing of results.

Some relatively gratuitous suggestions might be:

a. Postpone formal grammar instruction until, at least, the eighth year, devoting the time now given to it in lower grades to careful use of English in *all* work and in special language lessons.

b. Use only such grammatical terms and study of the science of grammar as seem, or are proved, to be actually necessary. Select carefully these terms and principles and standardize them. All the pupils in a school system or in the country may well use the same names for the same things in this field. (Steps are being taken in this direction.) With such use and selection all the principles may be given in an organized review covering probably not more than the last half of the eighth year. Many children will, of course, never reach this grade, but they *may* be able to write their letters and speak with fair correctness when they go out into the larger life, and this is essential.

c. The functional use of language in as nearly as possible real life situations, drills in correct speech, and "never-failing watch and care" over the ordinary language of the classroom and playground should take the place of most of the large amount of time[4] now given to this subject in our elementary schools. There are many subjects which to the adult appear finely adapted and quite necessary for the children's education. Of the many proposed we must select only those which actually are of the greatest value and which the child can assimilate and use in the short average time of his school days.

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[1]See Payne's "Public Elementary School Curricula."

d. School text-books in language, so necessary for most American teachers, should be selected with the greatest care. Many now attempt the functional method of teaching grammar and correlate it closely with language work. In order to get a wide sale for the books, however, all the grammar that any schoolman might demand is crowded in, so careful selection and elimination is necessary even in the best texts. For the experienced and able teacher the life situations of her class will prove more useful as guidance material for language work than any text, valuable as the latter sometimes is.

## Appendix I.

### *Directions for Giving Tests.*

"The object in giving these tests is to determine what relation a knowledge of grammar bears to the ability to use good English and to interpret language.

"First, give a test in composition, allowing the pupils to write for forty minutes on this subject (which should be written on the board without development): 'How would you spend a thousand dollars if that sum should be given you to spend during the Christmas holidays? Why would you spend the money as you propose rather than in any other way?' Pupils should write the name, address, name of school, etc., at the head of the composition, as asked for in the test in grammar.

The tests in grammar and in power of interpretation should follow as soon after the test in composition as convenient. These two tests should be given on successive days, in the order given: *i. e.*, the test in interpretation following the test in grammar.

Arrange the papers for each test in order of merit, the best on top.

### *Test in Grammar.*

State these facts at the top of the first sheet of paper:

1. Date of test.
2. Your name.
3. Your address.

4. Name of your school.
5. Your age (at last birthday).
6. Date of birthday.
7. Grammar school last attended.
8. How many years did you attend there?
9. Have you ever studied the poem quoted below, Gray's "Elegy Written in a Country Churchyard?" If so, to what extent?

(Answer as many of the following questions as you can in 40 minutes. The questions are all based on the following stanzas from Gray's "Elegy Written in a Country Churchyard:")

1. The curfew tolls the knell of parting day,
   The lowing herd winds slowly o'er the lea,
   The plowman homeward plods his weary way,
   And leaves the world to darkness and to me.

2. Now fades the glimmering landscape on the sight,
   And all the air a solemn stillness holds,
   Save where the beetle wheels his droning flight,
   And drowsy tinklings lull the distant folds;

3. Save that, from yonder ivy-mantled tower,
   The moping owl does to the moon complain
   Of such as, wandering near her secret bower,
   Molest her ancient solitary reign.

4. Beneath those rugged elms, that yew tree's shade,
   Where heaves the turf in many a mouldering heap,
   Each in his narrow cell forever laid,
   The rude forefathers of the hamlet sleep.

1. Select and write out in full (a) a compound sentence; (b) a complex sentence.
2. Diagram or analyze the last two lines in the first stanza.
3. Select (a) two phrases and (b) two clauses. Tell what each modifies.
4. Give the part of speech of the first word of each stanza, and tell why you so classify it.
5. What is the case of each of the nouns in the last stanza? What determines the case in each instance?
6. Give the voice, mode, tense and number of the verbs in stanza 3; also tell whether they are transitive or intransitive, and why.
7. Name the adjectives in stanza 3, and tell what the use of each is in the sentence.
8. Give the simple subject, the simple predicate, the complete subject and the complete predicate of the sentence in stanza 4.
9. What part of spech is each of the following words? Give your reason for so classifying it:

   First stanza: *o'er, homeward.*
   Fourth stanza: *those, many.*

10. Select four verb-forms that are not used as simple predicates. As what part of speech is each used?

### *Test in Interpretation.*

Time, 50 minutes.

1. Express in prose the thought of the stanzas given below. Use the language of the poem as far as possible, making, however, such changes as may be necessary to render the thought in clear, straightforward prose. Unusual words may be looked up in the dictionary.

These stanzas are taken from Gray's "Elegy Written in a Country Churchyard." It will be recalled that the part of the poem preceding these stanzas contains a description of the churchyard and of the character of the "rude forefathers of the hamlet" buried there. In the stanzas given the poet continues to refer to these buried forefathers:

Perhaps, in this neglected spot is laid
  Some heart once pregnant with celestial fire;
Hands that the rod of empire might have swayed,
  Or waked to ecstasy the living lyre.

But Knowledge to their eyes her ample page,
  Rich with the spoils of time, did ne'er unroll;
Chill Penury repressed their noble rage,
  And froze the genial current of the soul.

Th' applause of list'ning senates to command,
  The threats of pain and ruin to despise,
To scatter plenty o'er a smiling land,
  And read their history in a nation's eyes,

Their lot forbade; nor circumscribed alone
  Their growing virtues, but their crimes confined;
Forbade to wade through slaughter to a throne,
  And shut the gates of mercy on mankind.

2. Give the thought of these four stanzas briefly in your own words.

## Appendix II.

### *Individual Records Given as Deviations from Type.*

In the following table is given the individual marks of the pupils expressed, for convenience in verification,[5] as deviations from the medians 77, 23 and 19, respectively. In order to avoid fractions all records in composition and interpretation were doubled, the actual medians for composition and interpretation having been 11.5 and 9.5. The marking was done in the same way as in the Indianapolis tests. "Each answer in the grammar test was marked on a scale of ten. The sum of these marks gave the 'quantity mark' for the paper. The mode or the average[6] was taken as the 'quality mark.' The total

[5]Original marks can easily be obtained from these if desired, as above noted.
[6]The average was taken when it was near the mode, or was typical; otherwise the mode was used.

mark for the paper was obtained by the use of the following formula: (Quality mark × 5) + Quantity mark." This accounts for the marks above one hundred in grammar.

"The composition and interpretation papers were marked on the scale of twenty, an average paper receiving the mark of ten."

| Individual. | Grammar. | Composition. | Interpretation. |
|---|---|---|---|
| 1 | 26 | 9 | 1 |
| 2 | 30 | 13 | — 1 |
| 3 | —12 | — 3 | —18 |
| 4 | 9 | 3 | —11 |
| 5 | 26 | — 1 | — 1 |
| 6 | 3 | 1 | 15 |
| 7 | 4 | 13 | 17 |
| 8 | 13 | 1 | 1 |
| 9 | 43 | 3 | 1 |
| 10 | —17 | 1 | 3 |
| 11 | 15 | 3 | — 1 |
| 12 | 25 | 5 | — 3 |
| 13 | — 4 | — 5 | — 1 |
| 14 | 32 | — 3 | — 9 |
| 15 | 31 | 5 | 1 |
| 16 | 1 | — 3 | — 1 |
| 17 | — 7 | 5 | — 5 |
| 18 | — 1 | — 1 | —15 |
| 19 | 15 | 1 | — 3 |
| 20 | 20 | 3 | 5 |
| 1 | —13 | — 7 | — 3 |
| 2 | 8 | 1 | — 9 |
| 3 | —19 | —18 | 5 |
| 4 | —30 | 1 | — 7 |
| 5 | 18 | 3 | — 3 |
| 6 | 0 | — 6 | — 1 |
| 7 | —22 | — 1 | 1 |
| 8 | —14 | 1 | — 5 |
| 9 | 11 | 3 | —15 |
| 30 | 37 | 1 | 5 |
| 1 | 37 | — 1 | 7 |
| 2 | — 3 | 3 | 5 |
| 3 | 11 | 3 | —11 |
| 4 | 9 | 2 | — 8 |
| 5 | —32 | — 5 | 3 |
| 6 | — 6 | 15 | 1 |
| 7 | 2 | 5 | 15 |
| 8 | 23 | 1 | 1 |
| 9 | —52 | 11 | 1 |
| 40 | —14 | 9 | —11 |
| 1 | —10 | 11 | 3 |
| 2 | 15 | — 7 | 1 |
| 3 | 15 | 1 | — 7 |
| 4 | — 9 | — 7 | 1 |
| 5 | — 6 | 1 | — 5 |
| 6 | —13 | 3 | 3 |
| 7 | 30 | — 3 | — 7 |
| 8 | — 9 | — 1 | — 1 |
| 9 | —32 | — 7 | — 7 |
| 50 | —31 | — 5 | — 9 |

| Individual. | Grammar. | Composition. | Interpretation. |
|---|---|---|---|
| 51 | —35 | — 9 | — 7 |
| 2 | 25 | 5 | 1 |
| 3 | — 9 | — 4 | — 1 |
| 4 | —22 | — 1 | 4 |
| 5 | — 4 | 3 | 4 |
| 6 | — 7 | — 5 | — 1 |
| 7 | 29 | — 9 | 5 |
| 8 | 13 | 3 | 1 |
| 9 | 0 | — 1 | 9 |
| 60 | 6 | 3 | 3 |
| 1 | — 6 | — 6 | 1 |
| 2 | 32 | 9 | 1 |
| 3 | —37 | 3 | — 5 |
| 4 | — 6 | — 1 | —17 |
| 5 | —25 | — 3 | — 7 |
| 6 | — 4 | — 3 | —15 |
| 7 | 12 | —11 | — 9 |
| 8 | 5 | —19 | 1 |
| 9 | 7 | — 3 | 1 |
| 70 | — 4 | 5 | 3 |
| 1 | —16 | — 7 | 1 |
| 2 | — 1 | 1 | — 3 |
| 3 | 22 | — 9 | — 5 |
| 4 | —15 | 7 | — 1 |
| 5 | — 9 | — 1 | — 3 |
| 6 | — 9 | — 3 | 2 |
| 7 | 7 | 15 | — 1 |
| 8 | —12 | 5 | 1 |
| 9 | 6 | —11 | — 3 |
| 80 | —24 | — 3 | — 3 |
| 1 | 9 | —13 | — 9 |
| 2 | 9 | 1 | —15 |
| 3 | 2 | 7 | 1 |
| 4 | — 5 | —17 | 1 |
| 5 | 2 | 3 | 1 |
| 6 | 2 | — 1 | 1 |
| 7 | — 7 | — 4 | — 3 |
| 8 | 10 | 3 | — 1 |
| 9 | 31 | 1 | 3 |
| 90 | — 7 | —11 | — 7 |
| 1 | 20 | 1 | 9 |
| 2 | 22 | — 4 | — 5 |
| 3 | 24 | 5 | — 1 |
| 4 | 42 | 5 | 1 |
| 5 | 3 | 3 | 1 |
| 6 | —37 | 1 | — 1 |
| 7 | 11 | 3 | 5 |
| 8 | —16 | 5 | 9 |
| 9 | — 8 | 3 | 11 |
| 100 | —13 | 3 | 5 |

| Individual. | Grammar. | Composition. | Interpretation. |
|---|---|---|---|
| 101 | 37 | 7 | — 3 |
| 2 | —16 | —17 | — 7 |
| 3 | —22 | 3 | — 1 |
| 4 | 2 | 3 | — 7 |
| 5 | — 5 | — 3 | — 9 |
| 6 | —15 | — 5 | —17 |
| 7 | —12 | 1 | 13 |
| 8 | 1 | 3 | — 5 |
| 9 | 0 | 3 | — 3 |
| 110 | 1 | — 3 | 3 |
| 11 | 13 | 3 | 11 |
| 12 | 13 | 5 | —13 |
| 13 | 22 | — 5 | — 3 |
| 14 | —15 | 3 | 13 |
| 15 | —25 | — 1 | —17 |
| 16 | — 7 | —11 | —15 |
| 17 | 25 | — 3 | —13 |
| 18 | 53 | 5 | —11 |
| 19 | — 5 | — 7 | 7 |
| 120 | 22 | 1 | 4 |
| 1 | 29 | — 5 | — 3 |
| 2 | 17 | 3 | — 9 |
| 3 | 2 | — 3 | — 1 |
| 4 | 71 | 13 | 21 |
| 5 | 34 | 5 | 1 |
| 6 | 13 | 1 | — 9 |
| 7 | 15 | — 1 | —13 |
| 8 | —15 | 3 | — 7 |
| 9 | — 6 | 5 | — 5 |
| 130 | 13 | — 7 | —17 |
| 1 | — 8 | — 3 | —15 |
| 2 | — 1 | 1 | 17 |
| 3 | — 1 | — 7 | —15 |
| 4 | 6 | — 1 | — 9 |
| 5 | 20 | — 3 | 1 |
| 6 | 11 | 1 | — 7 |
| 7 | 11 | 3 | 7 |
| 8 | 5 | 5 | 1 |
| 9 | 13 | — 1 | — 7 |
| 140 | 1 | 5 | — 3 |
| 1 | — 4 | 3 | — 5 |
| 2 | — 8 | 1 | — 9 |
| 3 | 29 | — 9 | — 7 |
| 4 | 5 | — 3 | 3 |
| 5 | 3 | 1 | — 7 |
| 6 | — 4 | — 1 | — 9 |
| 7 | —25 | —17 | — 9 |
| 8 | 9 | 3 | 5 |
| 9 | — 8 | 5 | — 7 |
| 150 | 12 | — 1 | — 5 |

| Individual. | Grammar. | Composition. | Interpretation. |
|---|---|---|---|
| 151 | — 2 | 5 | —11 |
| 2 | —12 | 3 | 1 |
| 3 | —12 | 5 | 17 |
| 4 | — 6 | 1 | — 3 |
| 5 | 13 | 3 | 1 |
| 6 | 11 | 13 | 19 |
| 7 | 1 | 3 | 9 |
| 8 | 1 | — 3 | 11 |
| 9 | 3 | — 3 | — 1 |
| 160 | 13 | 3 | — 9 |
| 1 | 13 | — 1 | — 5 |
| 2 | — 3 | 1 | 5 |
| 3 | 13 | 1 | — 3 |
| 4 | 2 | — 7 | 9 |
| 5 | —11 | — 1 | — 7 |
| 6 | 12 | 3 | 1 |
| 7 | — 9 | — 3 | 3 |
| 8 | 21 | — 7 | 1 |
| 9 | —12 | —13 | — 9 |
| 170 | — 4 | — 1 | 1 |
| 1 | — 7 | 3 | —11 |
| 2 | 3 | — 3 | 17 |
| 3 | — 4 | 3 | 15 |
| 4 | — 7 | 3 | 7 |
| 5 | —12 | 5 | — 3 |
| 6 | —13 | —15 | 1 |
| 7 | — 7 | 1 | 3 |
| 8 | 4 | — 1 | 1 |
| 9 | 31 | — 3 | — 3 |
| 180 | 1 | — 3 | — 7 |
| 1 | 0 | — 9 | — 7 |
| 2 | 15 | — 1 | — 9 |
| 3 | — 5 | 1 | 7 |
| 4 | 3 | — 5 | 1 |
| 5 | 12 | — 5 | 5 |
| 6 | 2 | 1 | — 1 |
| 7 | 2 | 1 | 1 |
| 8 | — 6 | —11 | 9 |
| 9 | 3 | —15 | 1 |
| 190 | 12 | — 1 | 13 |
| 1 | — 8 | — 3 | 1 |
| 2 | 6 | — 1 | — 3 |
| 3 | —11 | —13 | 3 |
| 4 | —20 | 7 | — 3 |
| 5 | —11 | — 3 | — 5 |
| 6 | 3 | — 5 | — 7 |
| 7 | —14 | 1 | 17 |
| 8 | — 7 | — 1 | 1 |
| 9 | 21 | 1 | 11 |
| 200 | 5 | 5 | 5 |

# THE SLEEP OF SCHOOL CHILDREN: ITS DISTRIBUTION ACCORDING TO AGE, AND ITS RELATION TO PHYSICAL AND MENTAL EFFICIENCY.[1]

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## Part I. The Distribution of Sleep According to Age.

Among the important questions which may be raised regarding the sleep of school children are the following: What is the optimum amount of sleep for physical and mental efficiency, and how are we affected by variations above or below this amount? How great are the normal individual differences? To what extent is the instinct of sleep educable? How is it influenced by food habits, by rise and fall of barometric pressure, or by changes in humidity and other weather conditions? How is it affected in quantity and quality by ventilation, by light, by the presence of others in the same bed or rooms, etc.? How is it influenced by various evening occupations? How much and what kind of home study can be assigned by the school without a detrimental effect upon sleep?

One of the most important problems and the one which has caused the most speculation concerns the optimum amount of sleep for children at different periods of growth. In all of the discussions concerning school overpressure, care of infants, etc., authors have very generally laid great emphasis upon the necessity of a large amount of sleep for the developing organism. But exactly how much sleep *is* required by this developing organism for its healthy functioning and growth? We have a large number of *estimates based upon opinion and loose observation,* but no answer based on data of scientific validity.

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[1]This study will appear in three parts. The bibliography references will be found at the end of Part III.

The most quoted of these estimates is that of Dr. Clement Dukes, whose theoretical norms have been very generally accepted. Other notable standards are those of Hertel, Bernhard and Claparède. Physicians and writers on school hygiene agree in insisting that children are likely to receive less sleep than is needful to them, but disagree as to the exact amount which is needful. This difference of opinion is well shown in the following table of estimates by various authors:

TABLE I.—ESTIMATES OF SLEEP NEEDS IN HOURS.

| Age..... | 5 to 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Duke ..... | 13½ | 13 | 12½ | 12 | 11½ | 11 | 10½ | 10 | 10 | 9½ | 9 | 9 | 8½ |
| Bernhard ..... | .. | 11 | 11 | 11 | 10½ | 10½ | 10 | 10 | 9½ | .. | .. | .. | .. |
| Hertel ..... | 11 | 10½ | 10½ | 10 | 10 | 9¾ | 9½ | 9½ | 9 | 9 | 8¾ | .. | .. |
| Claparède .... | 11½ | 11½ | 11½ | 10½ | 10½ | 9½ | 9½ | 9½ | 9 | 9 | .. | .. | .. |
| Manaceine .... | 14 | 11 | 11 | 11 | 10 | 10 | 9½ | 8½ | 8½ | 8 | 8 to 7 | .. | .. |
| Krollich ..... | .. | 11 | 11 | 11 | 10½ | 10½ | 10 | 10 | 9½ | 9 | 9 | 8½ | 8½ |
| Cavanagh .... | .. | 12 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 9 |
| Brown ..... | 11½ | .. | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. | .. |
| Pfaunder ..... | 11 | .. | .. | .. | .. | .. | 9 | .. | .. | .. | .. | .. | .. |
| Key ..... | 11 | .. | .. | .. | .. | .. | 10 | .. | .. | .. | .. | .. | .. |

The above table shows a difference of opinion amounting to 2½ hours for the age six, 2½ hours for seven years, 2 hours for eight years, 2 hours for nine years, etc. Duke recommends as many hours for age eighteen as Manaceïne for age thirteen, and as many hours for age fourteen as Manaceïne for age ten. Duke's estimate for eleven years also equals Key's for six years. In like manner twenty-nine medical officers of English schools who were interrogated by Acland (1)* estimated the sleep needs of twelve-year-old boys all the way from nine hours to ten or more.

Such extreme differences of opinion on this important subject emphasize the desirability of empirically ascertained standards of sleep for the various ages of childhood.

Several investigations have been made of the number of hours children do sleep, though obviously we cannot in this way determine conclusively how many hours they ought to sleep. One of the earliest of these was by Hertel, who, in his study "*Overpressure in the Schools of Denmark*," presents sleep records from 3141 boys and 1211 girls in the schools of

*Numbers in parentheses throughout the text refer to bibliographical references which will follow at the end of part III.

Copenhagen. These averaged about 10½ to 11 hours of sleep at six years, the amount decreasing to 9½ hours at twelve years and to about 8½ at sixteen years. Sleep was most deficient among pupils pursuing the arduous classical courses, where it often fell to 6 or 7 hours.

The following table compiled by Acland shows the hours of "undisturbed rest" given to boys of 10 to 13 years of age in forty English public boarding schools. The actual time of sleep must be somewhat below these figures, and is certainly far below what physicians have usually considered the optimum:

TABLE II.—HOURS OF REST IN ENGLISH BOARDING SCHOOLS.

| Class. | No. of Schools. | Ample Hours. | Moderate Hours. | Short Hours. |
|---|---|---|---|---|
| A. | 5 | 9¾ to 10 or more all the year. | 9 during the summer term. | |
| B. | 2 | 9½ to 10 the two winter terms. | | |
| C. | 7 | 9½ to 10 for a few weeks only. | 9 to 9½ the chief part of the year. | |
| D. | 3 | | 9 to 9¼ all the year. | |
| E. | 7 | | 9 to 9½ the two winter terms. | 8 to 8½ during the summer term. |
| F. | 8 | | 9 to 9½ for a few weeks only. | 8 to 8½ the chief part of the year. |
| G. | 8 | | | 8 to 8¾ or less all the year. |

The most extensive investigations of the sleep of school children are those of Dr. L. Bernhard (5) and Dr. Alice Ravenhill (31). Bernhard secured data from 6551 German children six to fourteen years of age; Ravenhill from 6180 English children of corresponding ages. The average amount of sleep for each year is shown in the following table:

TABLE III.—SLEEP OF GERMAN AND ENGLISH CHILDREN.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Age..... | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
| Sleep in hours and minutes. | Bernhard.. | 10.20 | 9.50 | 9.25 | 9.20 | 9.10 | 8.55 | 8.25 | 7.50 | |
| | Ravenhill.. | 10.30 | 10.30 | 9.30 | 9.15 | 9.15 | 8.45 | 8.15 | 8.30 | Boys |
| | | 10.45 | 10.30 | 10.15 | 9.30 | 9.30 | 9.15 | 8. | 7.30 | Girls |

Using his own estimate of the amount of sleep which children ought to have, Bernhard computes that the sleep deficiency among his 6551 pupils ranges from about an hour at the age of seven to nearly an hour and three-quarters at fourteen years. This would represent a total sleep loss per year of over 400 hours for the average child of six, and over 600 hours for the average child of fourteen years. Basing her estimate upon the standards furnished by Dr. Dukes, Miss Ravenhill finds an average sleep deficiency for English children of nearly 25 per cent., while that for girls of thirteen years amounts to a daily loss of 3¼ hours! Children of six years were found who slept only 7 hours, and children of twelve years 4 to 6 hours.

In America N. C. Johnson (21) investigated the sleep of 600 pupils in Indiana high schools, finding a range in the averages for the four high school classes from about 8½ hours (among first-year girls) to 7½ hours (among fourth-year boys). Prof. W. H. Burnham (6) found an average of about 7 hours 53 minutes among 297 American normal school students, most of whom were young women between 18 and 22 years of age. A report by J. Mace Andress (2) of the sleep of 49 normal school students, who kept careful daily records of their sleep for fourteen successive days, gave an average somewhat more than one-half hour in excess of that found by Burnham.

## THE PRESENT INVESTIGATION.

During the year 1911-1912 the writers carried out an investigation of the sleep of school children which had for its threefold purpose (1) to ascertain by more careful methods than had yet been employed the hours of sleep of children in the Western States of America, (2) to discover what correlation exists between hours of sleep and school success, and (3) to find the relation of hours of sleep to social status, home study and the possession of typical "nervous" traits. Through the generous co-operation of teachers and principals sleep records

were secured from 2692 children[2] between 6 and 20 years of age in the California cities of Stockton, San Jose, Alameda and Los Gatos; from Tempe, Ariz., and Monmouth, Ore.[3]

The records were secured by the teachers asking the pupils to fill out the following form immediately after the opening of the morning school session. (A somewhat simpler form was used for the first three grades:)

Name.....Age.....Grade.....

1. When did you go to bed last night?
2. How long do you think it took you to go to sleep?
3. When did you wake up this morning?
4. Did anyone have to wake you?
5. How many others slept in the same room?
6. How many others slept in the same bed?
7. How many windows are there in your bedroom?
8. How many windows were open during the night?
9. How wide were they open?
10. Did you sleep your usual amount last night? If not, was it more or less than usual? How much?
11. How many hours per week do you work outside of school?
    a. In school study at home?
    b. In elocution, music, drawing, etc.?
    c. In carrying papers, running errands or other work?

In order to insure uniform procedure in the collection of the records the following instruction sheet was given each teacher in advance:

(1) On the day before the sleep records are to be collected say to the children, just before dismissal of school in the afternoon, that you would like to know how many hours they sleep. Tell them to look at the clock "tonight" just as they go to bed and to write down on a piece of paper the exact time. (Make it clear that they are to make the record just as soon as they look at the clock.) Tell them also to look at the clock again as soon as they wake up next morning and to record the time on the same piece of paper. This piece of paper they are to bring to school next day.

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[2]Through the kind co-operation of Dr. H. H. Goddard sleep records were also secured from 383 feeble-minded persons. These records will be summarized in part III of this study.

[3]The writers desire to express their hearty appreciation of the intelligent and careful assistance rendered by all who co-operated in securing the records and in the somewhat laborious task of supplying the information asked in the supplementary blanks.

(2) Make no other request or announcement. Be especially careful to avoid giving any suggestion as to the amount of sleep you think children should have. Say nothing about windows.

(3) On the following day as soon as school assembles distribute the question sheets and request the pupils to answer all the questions they can. Tell them not to try to answer those they are not sure about. Make it clear that no one will be reproached for having forgotten to make the records or for inability to answer any of the questions. Pupils are not to be encouraged to guess.

The amount of sleep for these 2692 persons is shown in hours and minutes in the following table:[4]

| Age. | No. of records. | Av. No. hours of of sleep. | Age. | No. of records. | Av. No. of hours of sleep. |
|---|---|---|---|---|---|
| 6–7 | 37 | 11:14 | 13–14 | 250 | 9:31 |
| 7–8 | 147 | 10:41 | 14–15 | 244 | 9:06 |
| 8–9 | 218 | 10:42 | 15–16 | 201 | 8:54 |
| 9–10 | 291 | 10:13 | 16–17 | 167 | 8:30 |
| 10–11 | 307 | 9:56 | 17–18 | 117 | 8:46 |
| 11–12 | 282 | 10:00 | 18–19 | 43 | 8:46 |
| 12–13 | 312 | 9:36 | University students | 51 | 7:47 |

The most important fact in the above table is the striking excess of sleep among these children compared with the German and English children of Bernhard and Ravenhill. This excess amounts for most ages to between one hour and one hour and a half. At the same time the sleep averages found in this investigation fall from three-quarters hour to two hours below *the theoretical standards* set by Dr. Dukes. These points of difference are shown graphically in the following figure:

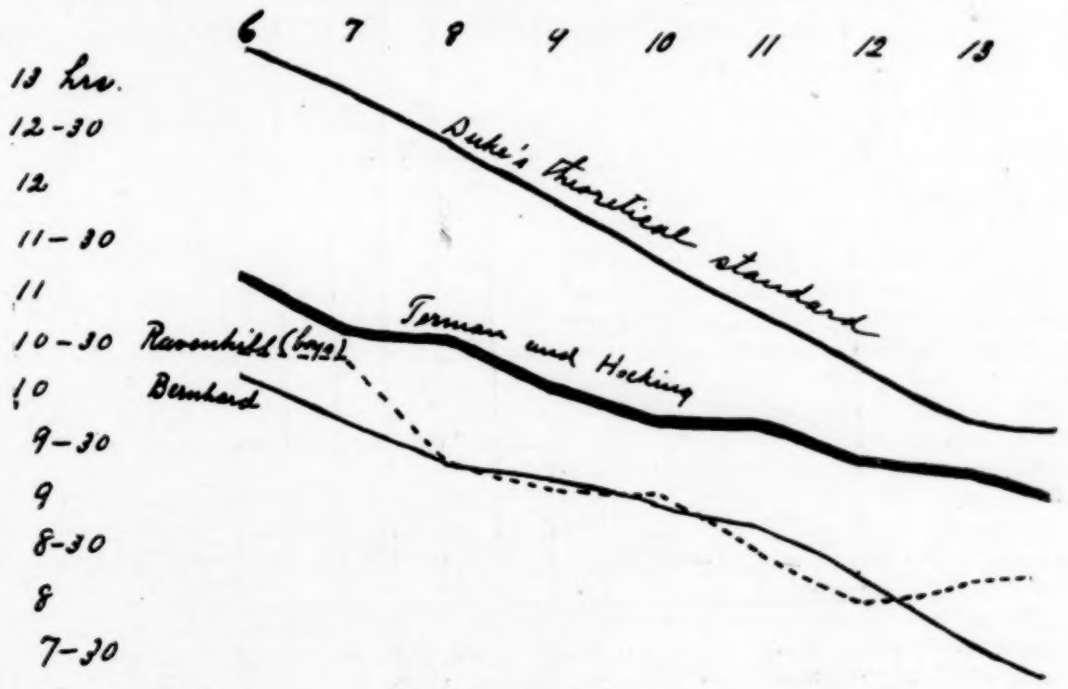


Figure 1.

[4]As the sex differences revealed by our results were exceedingly small, the figures for boys and girls have been combined in the above table.

For lack of space the curves of distribution for hours of sleep are shown only for ages six, nine, twelve, fifteen and eighteen.

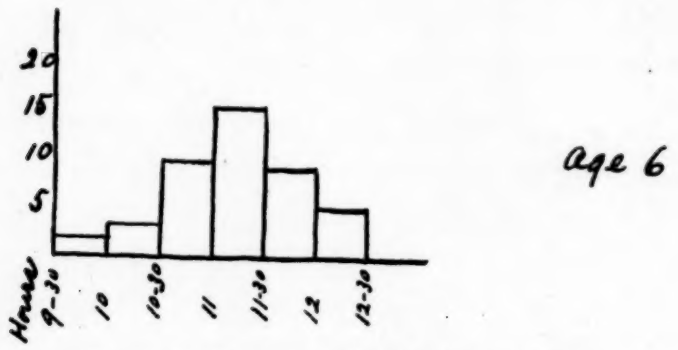


Figure 2. Curves of distribution of sleep.

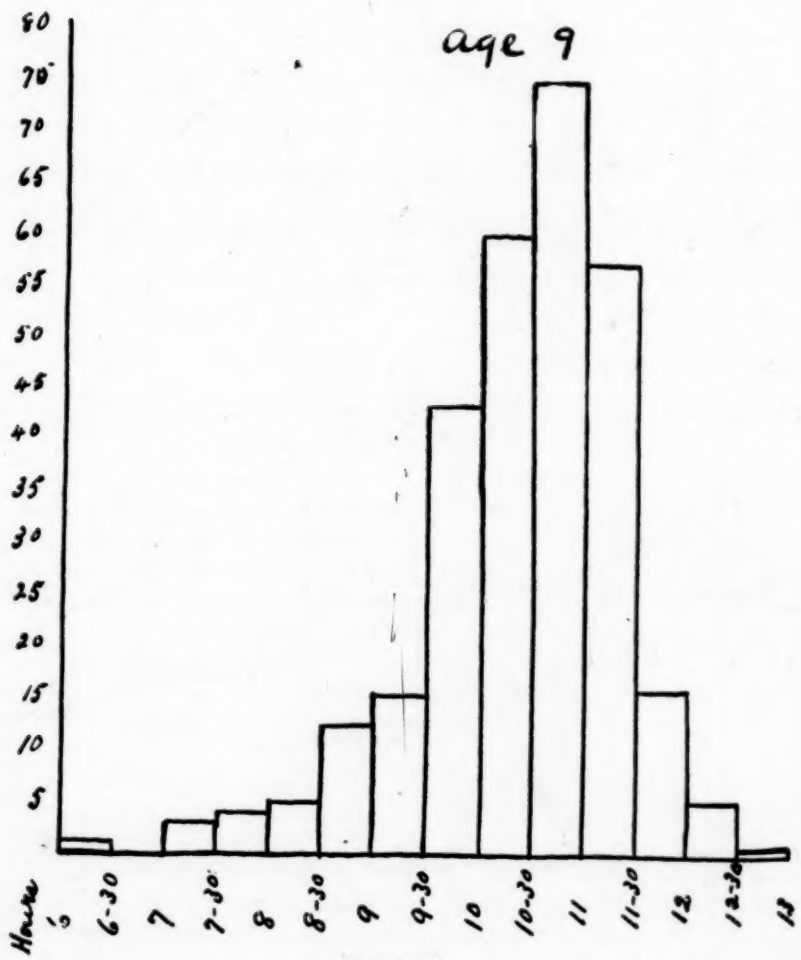


Figure 3.

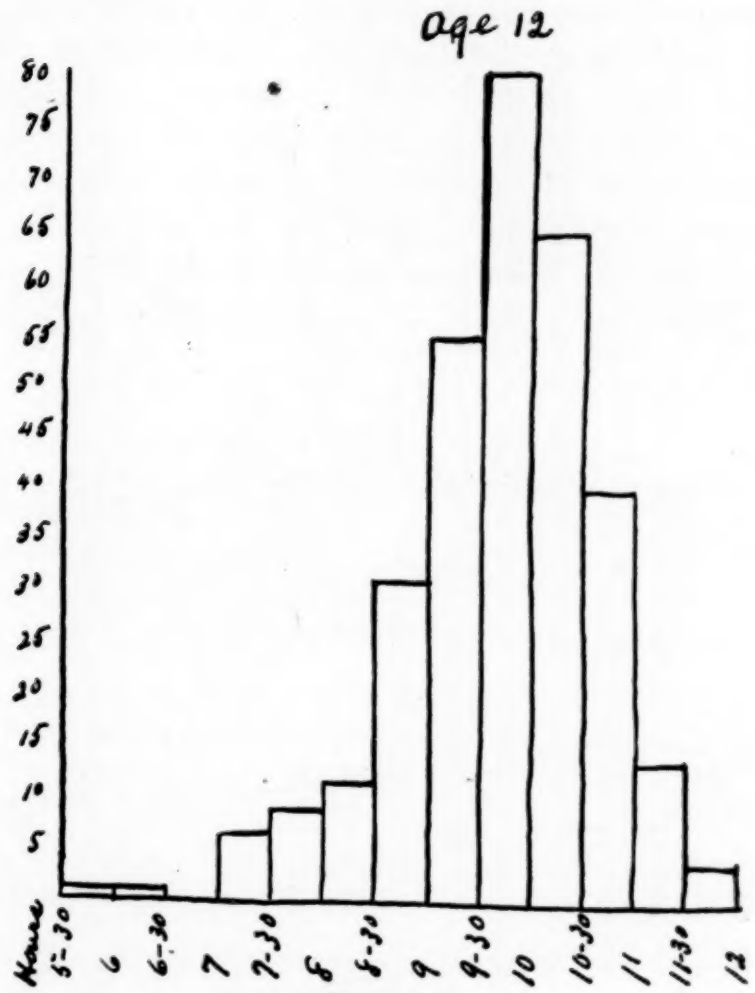


Figure 4.

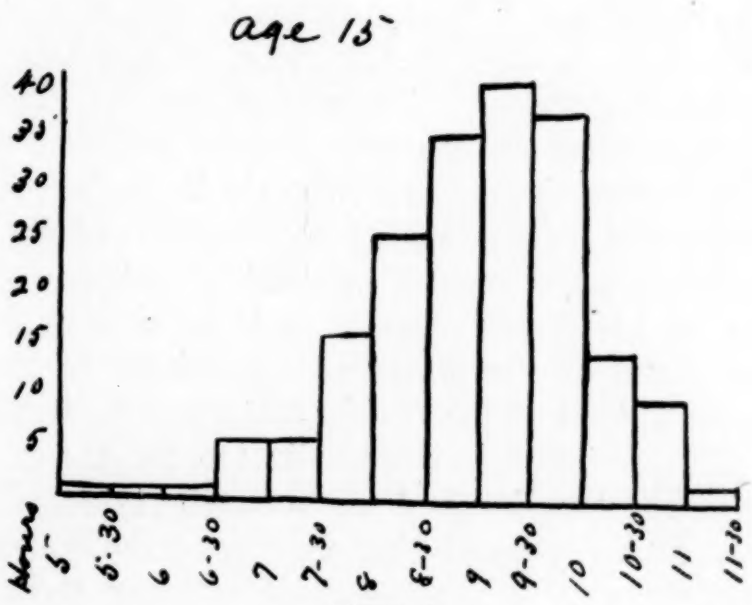


Figure 5.

Figure 6.

A further idea of variation may be secured from the following figure:

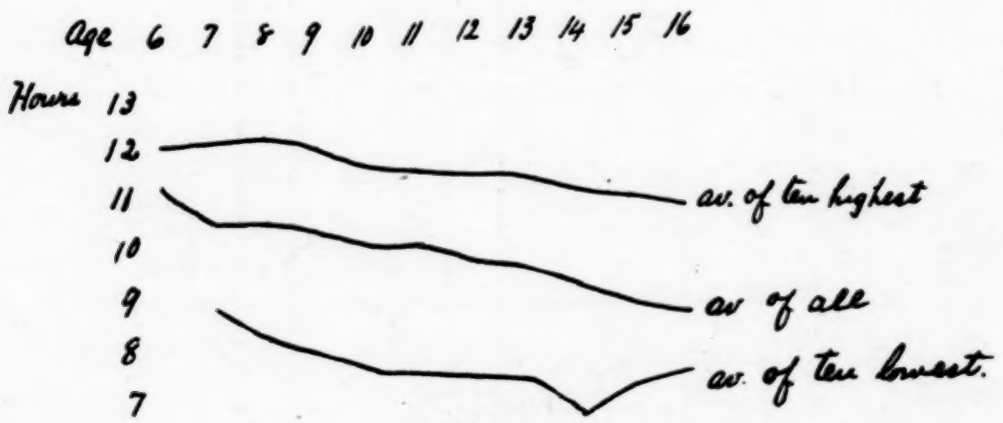


Figure 7.

It is seen, therefore, that the minimum amount of sleep received by children in the western part of the United States almost reaches the *average* for German and English children. Why this astonishing difference? Three explanations are at hand. *First,* and perhaps most important, the climatic conditions of the sections from which our data were gathered are such as to permit a far greater amount of outdoor life than is possible (or at least customary) in Germany and England. *Second,* the home environment of our children is probably much superior to that of the children studied by Bernhard and Ravenhill. Their statistics were collected mostly in industrial cities, ours in the smaller and more comfortable cities in the best sections of the United States, where the extreme overcrowding and poverty so common in European industrial cen-

ters are hardly known. *Third,* the forenoon school session begins with us at nine o'clock instead of eight, as is customary in European countries. There may be other factors, but all these are without doubt contributory to our results.

Our averages would have been still higher had all the children been permitted to sleep until they awakened spontaneously. The following figures show the percentage in each year who had to be awakened:

| Age... | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Per cent. awakened. | 21.2 | 19 | 23.3 | 19.1 | 22.8 | 20.3 | 23.6 | 24.7 | 26 | 31.6 | 38.7 | 39.9 | 47.7 |

The interesting fact here is the rapid increase in early adolescence of the number who did not wake spontaneously. The reason for this is not clear. It may be that adolescence tends to change the individual from the vesperal to the matinal type of sleeper. It is more probably due to the fact that a majority of the records above the age of fourteen were high school pupils who were required to do more evening work than the younger children.

Though it cannot be assumed that averages secured in this investigation furnish absolutely reliable norms of the amount children of various ages ought to sleep, it is believed that our standards are of more value for comparative purposes than any which have hitherto been available. The averages of Bernhard and Ravenhill probably show a subnormal amount of sleep, while the theoretical and traditionally accepted norms of Dukes are so high that we may safely dismiss them as worthless and misleading.

(*Continued in April Journal.*)

# ECONOMICAL LEARNING.

W. H. PYLE.

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If a person sets to work to form a new habit, or establish a new set of associations, how long should his practice periods be and how often should he practice? What is the value of short periods of practice as compared with long ones? Should the practice periods be daily or on alternate days? Or, would practice once a week do as well? These two problems, of the length and frequency of practice periods, are of great practical significance to education. They were first raised, so far as I know, by Ebbinghaus (2) in his work with nonsense syllables. He found that in committing to memory nonsense syllables, it was better to distribute the learning over several days than to learn them all in one day. There was both a saving of time in learning and better retention, when the learning was spread out over several days. In the writer's laboratory, the same thing has been found true in logical memory. Since Ebbinghaus' work, other psychologists have confirmed his results. Jost found a saving of 15 per cent. in extending the learning of a series of syllables over three days, ten repetitions a day, as compared with 30 repetitions, in one day.

More recently, Swift (6) has raised the question of daily versus alternate day work, and, quoting Morrison, says that work on alternate days is better than daily work. But Morrison (4) performed no definite experiments to determine the matter.

Dearborn (1) reports some class experiments, in which 5 minutes practice twice a day is compared to 10 minutes once a day, to the advantage of the latter. Starch (5) compared four different distributions of a total of 120 minutes. He

used one 120-minute period, three 40-minute periods, six 20-minute periods and twelve 10-minute periods. He found the 10-minute period best, the 20-minute period nearly as good, the 40-minute period next in value and the long period of least value. Both Dearborn and Starch complicate the problem. Only one condition should be varied at a time. If we start out to settle the question of interval, we should keep the time constant, and if we try to settle the question of time, we should keep the interval constant. Dearborn does not compare 10 minutes a day with 5 minutes a day, but with 5 minutes *twice* a day, which is quite a different matter. Starch combines in one experiment four different lengths of periods with four different distributions of time. In such a case, how are we to know what is due to length of period and what to interval between periods? What, for example, would Starch's 40-minute group have accomplished by working once a day or twice a day? Moreover, neither Starch nor Dearborn measure the learning capacity of their subjects. Starch has 42 subjects in all, only 7 in the smallest group. The number in his different sections was too small for us to assume equal ability in the different sections. One must either use a large number of subjects in the different sections that are to be compared, or measure the learning capacity of his subjects. This we have learned by bitter experience. The problem was first taken up in our laboratory in the spring of 1910, when we had several subjects learn shorthand by several procedures, but were unable to explain the results because of failure to fractionate the problem. In the year of 1910-11, we continued work on the problem, and undertook to measure the learning capacity of the learners by giving various initial tests. They, however, proved inadequate for the purpose. Our next improvement in method was to give the subjects practice for one week in the same type of work that they were to have in the experiment proper. This proved inadequate for the reason of great differences in learning type. Some subjects learn fast for a week and then learn much more slowly, while others keep up their ratio of improvement for a long time. Our final method was to give a check experiment of the same length as the experiment proper. In the check experiment, the sub-

jects all use the same method; in the experiment proper, the subjects vary one factor, either time or frequency.

## The Best Length of Period.

*Method and Material.*—For material, we invented 26 characters to take the place of the English alphabet. These characters are simple and easily made. On the first day of the experiment, the subjects spent 30 minutes learning the characters. Each person was allowed to choose his own method of learning them. On succeeding days each subject transcribed a psychological monograph into the new characters, all subjects working 30 minutes, each. They were told to work as fast as possible and do the work accurately. For a few days they were allowed to keep the key to the new alphabet before them. The practice was contineud for 17 days, including the first. Then a new alphabet was learned as before and the same matter transcribed into it. But instead of practicing 30 minutes at a time, one subject worked for 30 minutes, another for 15, another for 45 and another for 60 minutes. The work was continued as before for 17 periods. Now, there are two separate questions involved in this experiment: (1) If one practices once a day for 16 days, what is the effect of the length of period? (2) If a person has a definite amount of time to devote to practice, should he spend it in short periods, distributed over many days, or in long periods in fewer days? In settling either of these questions, we can treat the data in various ways. We can determine the average speed for the experiment or compare the final speed with the initial speed, etc. We give below two tables. In one the final speed attained in one procedure is compared with that attained in the other, and in each case final speed is not taken absolutely but as compared with the initial speed. The average speed for the last two days is subtracted from the average speed of the first two days, this speed is multiplied by 100 and divided by the initial speed, giving the percentage of improvement.

TABLE I.—*Comparison on basis of average speed.*

| Subject. | Method. | Improvement. |
|---|---|---|
| Edm | 15 min. | 4.8 per cent. less than in check experiment. |
| Ros | 30 min. | 30.3 per cent better than in check experiment. |
| Moo | 45 min. | 20.6 per cent better than in check experiment. |
| Var | 60 min. | 22.9 per cent better than in check experiment. |

In table I, the average speed made in 16 days' practice, using four different lengths of practice period, is compared with the sped made in 16 practice periods when all subjects used the same length of period, *i. e.*, 30 minutes. Using the average speed for the whole period as our criterion, it is plain that 15 minutes practice daily is not so effective as the longer periods. The 30-minute period seems best of all. There is an actual falling off in the two longer periods.

TABLE II.—*Comparison on basis of final speed attained.*

| Subject. | Method. | Improvement. |
|---|---|---|
| Edm | 15 min. | 12.7 per cent less than in check experiment. |
| Ros | 30 min. | 6.1 per cent less than in check experiment. |
| Moo | 45 min. | 3.3 per cent more than in check experiment. |
| Var | 60 min. | 5.7 per cent less than in check experiment. |

It will be observed from table II, that on the basis of final speed as compared to initial speed, 30 minutes practice is better than 15; 45 is better than 30; but an hour is no better than a half-hour. It is evident from a comparison of table I with table II, that if we consider the final speed attained, the 15-minute period does not appear at so great a disadvantage as it does when we consider the average speed of the whole experiment. This is probably because a subject using a 15-minute period makes slow progress early in the experiment, but in the latter part of the experiment, the 15 minutes are about as effective as the longer periods. This is borne out by a comparison of the speed attained in the last half of the two experiments with the speed of the first half, *i. e.*, by a comparison of the averages of the two halves. Such a comparison shows that a person using the 15-minute interval makes slow progress at first but in the last half of the experiment, makes an average that compares favorably with that made in the longer periods.

Now, the second question, in putting in the same absolute amount of time at practice, what is the best way to distribute it? In short daily periods or long daily periods? In answering this question, we can consider only four hours work, for that is the amount put in by the 15-minute subject. Therefore, we find the average speed and the final speed for four hours work in the check experiment and the same for the experiment proper.

TABLE III.—*Comparison on basis of average speed, same amount of time.*

| Subject. | Method. | Improvement. |
|---|---|---|
| Edm | 15 min. | 22.3 per cent better than in check experiment. |
| Ros | 30 min. | 36.1 per cent better than in check experiment. |
| Moo | 45 min. | 25 per cent better than in check experiment. |
| Var | 60 min. | 14.8 per cent better than in check experiment. |

It is plain from table III, that if we consider the average speed as our criterion, the 30-minute period is the best length for daily work. The 15-minute period is too short and the 45 and 60-minute periods are too long to get the best returns.

TABLE IV.—*On basis of final speed as compared with initial speed, same amount of time.*

| Subject. | Method. | Comparison. |
|---|---|---|
| Edm | 15 min. | 4.9 per cent less than in check experiment. |
| Ros | 30 min. | 18.1 per cent more than in check experiment. |
| Moo | 45 min. | 5.4 per cent less than in check experiment. |
| Var | 60 min. | 45.5 per cent less than in check experiment. |

Table IV warrants the same conclusion as table III. Thirty minute periods are best. Fifteen minutes are too short, 45 minutes are too long, and the disadvantage of an hour is plainly apparent.

## THE BEST INTERVAL BETWEEN PRACTICE PERIODS.

In comparing daily with alternate day work, the length of practice periods was kept constant with six subjects (Mil, Hig, Bau, Hal, Lon and Epp). With four subjects, however, different lengths of practice periods were used in the check experiment, but for all, 30 minutes was the length of practice in the experiment proper. In the check experiment Mag and Wat used 20-minute periods and Fie and Fin used 10-minute periods. The subjects should be compared in pairs, not only because of differences in the check experiment but because for each pair, the time of practice and other conditions were kept constant.

TABLE V.—*Improvement compared, daily and alternate days.*

| Subject. | Method. | Gain or Loss. | Method Favored. |
|---|---|---|---|
| Mil | daily | 17.2 per cent loss | daily |
| Hig | Alt. days | 22.6 per cent loss | |
| Bau | daily | 15.4 per cent loss | daily |
| Hal | Alt. days | 32.3 per cent loss | |
| Lon | daily | 12.0 per cent gain | daily |
| Epp | Alt. days | 2.1 per cent loss | |
| Wat | daily | 16.5 per cent gain | daily |
| Mag | Alt. days | 5.1 per cent gain | |
| Fie | daily | 5.2 per cent gain | daily |
| Fin | Alt. days | 4.6 per cent loss | |

The subjects shown in table V practiced for 16 periods in the experiment proper, except the last four, who practiced for 30 periods. In not a single case does practice on alternate days prove better. There is a silght advantage in favor of daily practice. But, just as when practice is continued for some time, short periods are probably as valuable as long ones, it may be that in the later stages of practice, the intervals might be lengthened without loss to the learner. But surely, if our figures prove anything, there is no advantage in the early stage of habituation, of practicing on alternate days.

In comparing daily with twice-a-day practice, six subjects were used, three working twice a day and three once a day. Those working twice a day, worked once early in the morning and once in the afternoon at 4 o'clock. Both groups were given a control experiment covering the same length of time as the experiment, which was for 15 half-hour periods. The results are shown in table VI. For sake of brevity, the results are given for groups only, and on the basis of final speed attained. The final speed is determined by finding the average of the last two practices.

TABLE VI.

| Group | I. Sec. per word in check exp. | II. Sec. per word in exp. | Ratio of II to I. | Method favored. |
|---|---|---|---|---|
| Daily | 5.68 | 3.68 | .65 | |
| Twice Daily | 5.83 | 4.07 | .70 | Daily |

It will be seen that the results show a slight advantage for once a day practice, but the difference is very small. The afternoon practice was after the university work of the day, and the students were probably somewhat more fatigued than in the morning. It is possible that if the subjects were in as good condition in the afternoon as in the morning and could maintain the same interest in the work, the afternoon practice would be as profitable as the forenoon practice. At any rate, this might be true in the early stage of habituation.

If the twice-a-day group is given the same number of days practice (twice as many periods) as the daily group, the advantage of twice-a-day work is plain. In 15 days (30 periods) the group practicing twice a day attains a speed which is only

53 per cent. of the time per word in the check experiment. The time per word of the daily section at the end of 15 days was 65 per cent of the time per word in the check experiment. The accompanying curves (Plate I) show the once-a-day method compared to the same number of *periods* and the same number of *days* in the twice-a-day method. In studying these curves,

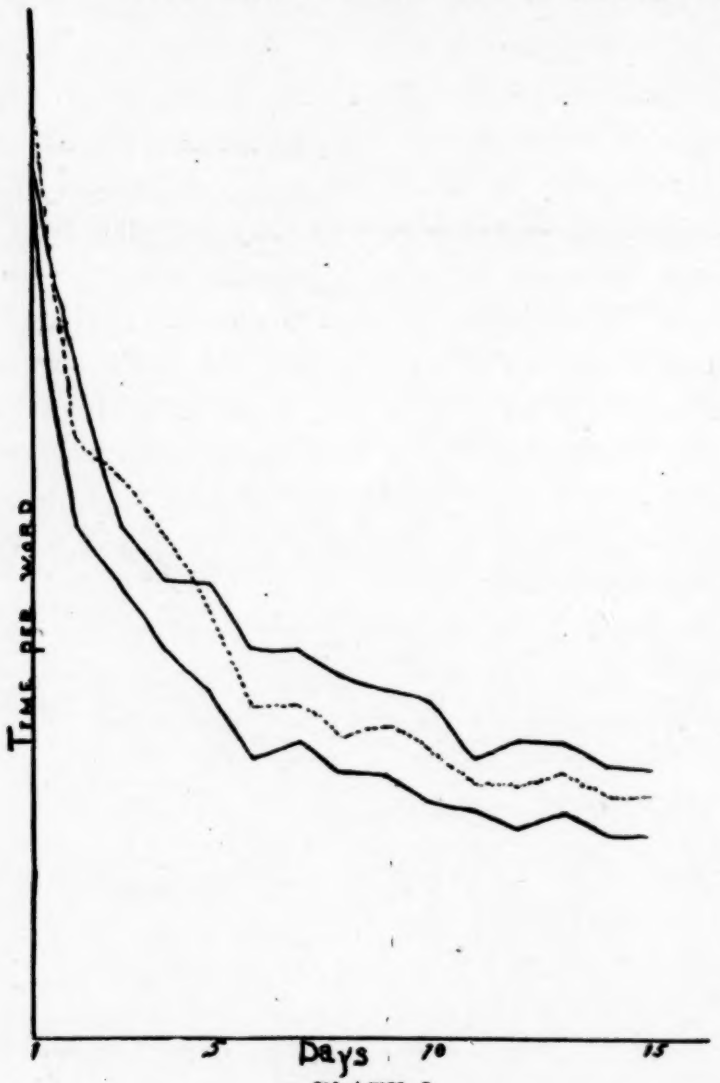


PLATE I.

Learning curves, once a day and twice a day. The dotted curve shows the record of the section working once a day. The upper solid line shows the record of the twice-a-day group practicing for the same number of periods as the once-a-day group. The lower solid curve shows the record of the twice-a-day group practicing for the same number of days as the once-a-day group, i. e., the upper line shows the same amount of hours as the dotted line, the lower curve shows the same number of days, but twice as many hours as the dotted line.

it must be remembered, however, that the twice-a-day group is 2.6 per cent. slower than the other group, as shown by the check experiment in table VI.

This experiment has also been carried out with a group of third grade school children, but in this case the practice was in addition, according to a definite method and careful procedure. The children were given an initial test of ten minutes in addition, and on the basis of this test divided into two groups of equal number and equal ability. One group was given ten

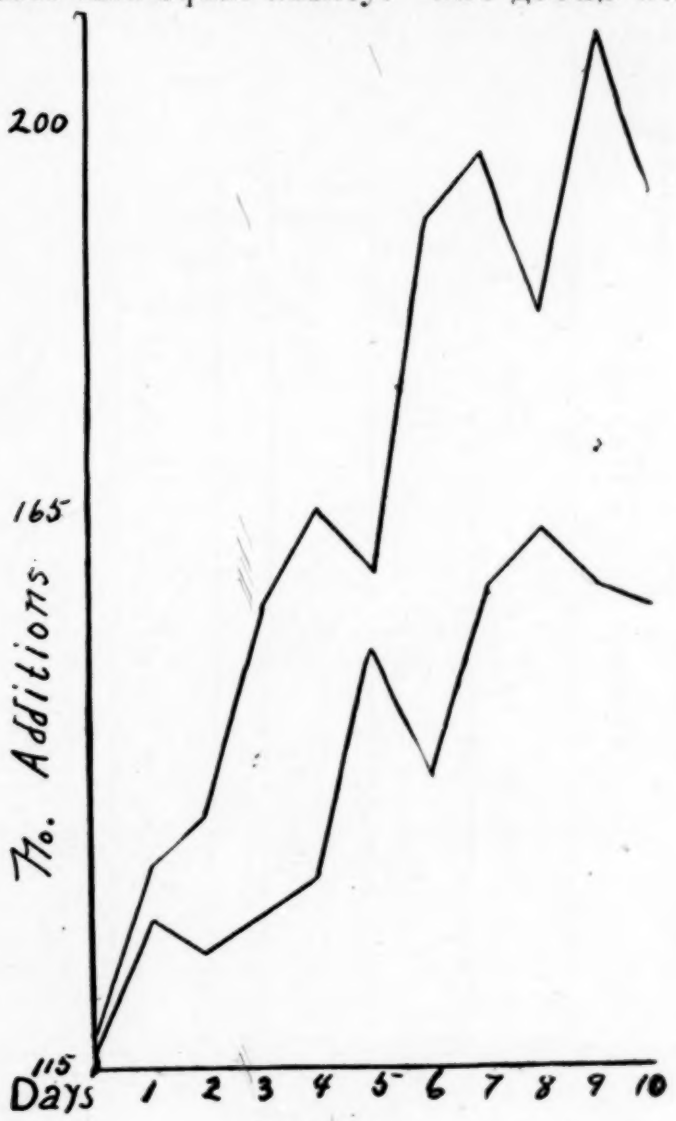


PLATE II.

Learning curves. Third grade children drilled in addition. The upper curve shows improvement of section working once a day, 10 minutes, for 10 days. The lower curve shows improvement of section working 10 minutes twice a day for 5 days.

minutes practice in addition for two weeks, in the morning only. The other group practiced in the morning and also in the afternoon for one week only. The results, shown in the curves of Plate II, are decidedly in favor of practice once a

day. The difference between the groups is much greater than was the case with the adults. It is probable that the children were much more fatigued in the afternoon and had much less interest as compared to the morning work, than was the case with the adults. It should be noted, however, that there are many possibilities of error in such work with school children,

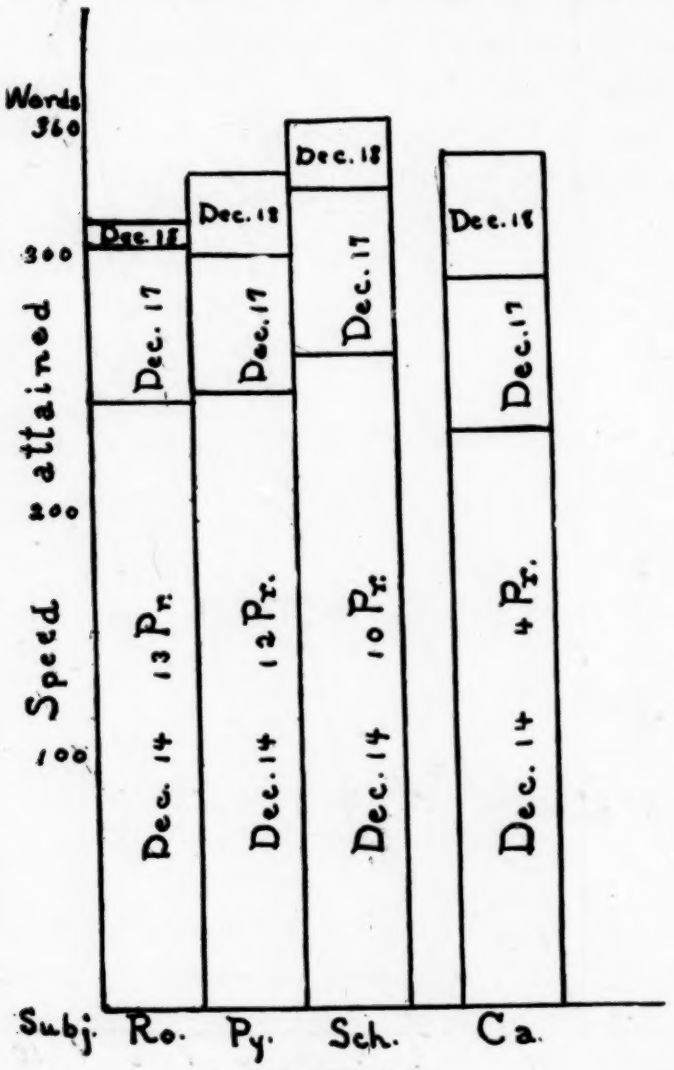


PLATE III.

although the experimenter used every precaution possible. This experiment was conducted for me by Miss Mabel M. Richards, principal of the Jennings School, St. Louis. I am having it repeated in several schools.

Our next step in the study of the best distribution of time was to perform as many half-hour periods of practice as possible in one day, resting a half-hour between practices. I

therefore began one morning, and practiced in this way for 14 half-hour periods in one day. The practice consisted in learning an alphabet as in most of the experiments above noted. One week later I repeated the experiment, using a different alphabet, and working with three other subjects. One subject for four periods only, the rest of us working all day, for 13, 12 and 10 periods. My first all-day experiment had shown that there was little improvement after the third or fourth period. My chief object in this repetition of the experiment was to determine whether a person who worked for four periods only, would get as much value from the four

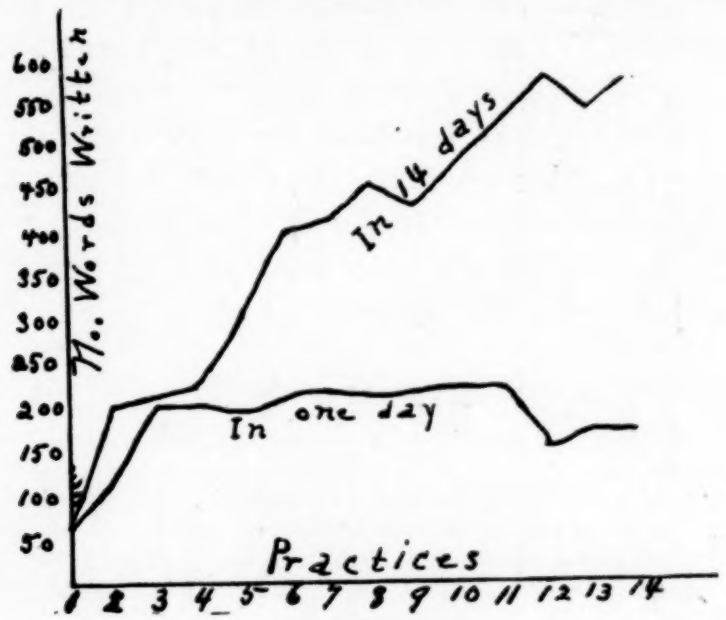


PLATE IV.

practices as the other subjects did from all-day practice. To test the effects of this first day practice, we worked for 30 minutes again two days later, and once, three days later. It will be seen from Plate III, that the person practicing only four times got nearly as much value from the practice (as shown by the two later tests) as did the subjects who worked all day. A check experiment showed the four subjects of this experiment to have about the same learning capacity. Perhaps a more striking comparison of the relative values of distributed versus concentrated practice is shown in the curves of Plate IV. The lower curve shows my own record for one day, fourteen practices, and the upper curve shows what my

record would be if the practices were distributed over 14 days. The upper curve is the actual curve of a subject (Sch) of the same learning capacity as myself, and working once a day for 14 days.

On the whole, our experiments warrant some such conclusion as the following: In habit formation an adult can practice profitably for something like 30 minutes daily. The length of time for practice doubtless varies with individuals and with the stage of fixation of the habit. If practice is extended beyond 30 minutes, there may be some return for the extra time but it is relatively small. It is quite probable that in the later stages of habituation, the length of practice period could be shortened and the interval lengthened with practically as much return. A second practice on the same day is not quite as beneficial as the first practice. After a few practices, further practice on the same day is useless. The next step in the experimental study of the economy of learning should be to determine the relative value of practice of every length of period from one minute up to an hour.

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# VALUE OF DAILY DRILL IN ARITHMETIC.

F. M. PHILLIPS.

*Submitted by Irving King, University of Iowa.*

The purpose of this investigation was to secure data from which to estimate the value of daily drill in definite lines of school work. The lines selected were the fundamental operations of arithmetic, and work in arithmetical reasoning. The work was carried on in the sixth, seventh, and eighth grades of the public schools of Granite Falls, Minn. A similar test, made recently by J. C. Brown,[1] suggested this study.

During the month of March, 1912, the writer gave the tests in fundamentals and in reasoning known as the "Stone tests," and described on pages 10-12 of Stone's "Arithmetical Abilities; Some Factors Determining Them." These tests were given to all the pupils of the above grades. The method of grading the papers was the same as that suggested by Stone, (pp. 16-17).

The tests were printed and distributed face downward among the pupils. At a given signal they turned the sheets over and began work. Exactly twelve minutes were given for the test in fundamentals, and fifteen minutes for the test in reasoning.

After the papers were graded, the pupils of each grade were divided into two groups of as nearly equal ability as possible. This was done by selecting the two highest and putting one of them in group one, and the other in group two; then selecting the two next in order, and so on down the list, thus getting about an equal number in each group, and getting the best and the poorest in each group. Then by a method of casting

[1]This Journal, Vol. II, p. 81.

lots, one group became a drill group and the other a non-drill group.

Those in the drill groups of each grade were given ten minutes' drill daily upon the fundamental operations of arithmetic, both oral and written, and upon reasoning problems usually designated as mental arithmetic. The other group of each grade was given no drill at the time the drill group was at work, but had its regular class work in arithmetic.

The work with the drill group was conducted by certain students of our Training Department, who were some of its best prospective teachers. The writer took special care to supervise the work, and to visit the drill classes as often as convenient. The work was done in class rooms outside of the regular grade rooms. These student teachers did not know the purpose of the drill work or the nature of the "Stone tests."

This drill was carried on for two school months, when a second test was given. The test in fundamentals was the same as given in the first test, and the reasoning test was similar to that given in the first test.

The method of grading was the same as that used in the first test. The highest grade possible in the fundamental test is 59, and in the reasoning test is 17.2. The papers of all those who were not able to take tests were laid aside, and the data used here were drawn only from the papers of the regular students who were in school all of the time, thus giving a fair basis for the investigation. The papers of 69 pupils are used; 33 boys, and 36 girls; 34 were in the drill group, and 35 in the non-drill group.

A comparison of the results of these two tests will be appended here by grades. When both the fundamental and reasoning abilities are considered, the grades of the reasoning test are multiplied by the coefficient, 3.43, which factor expresses the relation between 59 and 17.2. This is merely to give both tests equal standing in getting the conclusions.

Per cent. of improvement of the drill and non-drill sections in the first and second tests. "1" indicates drill sections; "11" non-drill section.

6th grade, 1, Fundamentals, 45 per cent.
6th grade, 1, Reasoning, 55 per cent.
6th grade, 11, Fundamentals, 54 per cent.
6th grade, 11, Reasoning, 36 per cent.
7th grade, 1, Fundamentals, 22 per cent.
7th grade, 1, Reasoning, 29 per cent.
7th grade, 11, Fundamentals, 10 per cent.
7th grade, 11, Reasoning, 17 per cent.
8th grade, 1, Fundamentals, 25 per cent.
8th grade, 1, Reasoning, 15 per cent.
8th grade, 11, Fundamentals, 16 per cent.
8th grade, 11, Reasoning, 12 per cent.
All 1 groups, Fundamentals, 31 per cent.
All 1 groups, Reasoning 33 per cent.
All 11 groups, Fundamentals, 27 per cent.
All 11 groups, Reasoning, 22 per cent.

The improvement in fundamentals of the combined drill groups was 15 per cent. greater than of non-drill groups. In reasoning the drill groups improved 50 per cent. more than the non-drill groups.

In every case, one excepted, the drill groups made a better gain than did the non-drill groups. In the sixth grade the non-drill group made a better increase in fundamentals. The greatest gains were made in the sixth grade, and the smallest in the eighth.

While these figures show a substantial and a satisfactory gain, they do not show in what part of the work the gains were most marked. For this purpose the following data are attached:

The gain of drill group in the three addition problems was 15 per cent.
The gain of non-drill groups in the three addition problems was 17 per cent.
The gain of the both groups in the three addition problems was 16 per cent.
The gain of the drill group in the multiplication problems was 37 per cent.
The gain of the non-drill group in the multiplication problems was 15 per cent.
The gain in the both groups in the multiplication problems was 25 per cent.

Thus it is seen that very little gain was made on the three problems in addition, the non-drill group showing the greater gain. While in the multiplication exercises a great gain was made, the drill group making nearly three times as much gain as did the non-drill group.

The sex of the student is considered in the following table:

In fundamentals the boys had 765 points in the 1st test, 1007 in 2nd.
In fundamentals the girls had 947 points in the 1st test, 1184 in 2nd.
In reasoning the boys had 714 points in the 1st test, 926 in 2nd.
In reasoning the girls had 732 points in the 1st test, 884 in 2nd.
The av. No. points of boys in fund was 23.2 in 1st test and 30.5 in 2nd.
The av. No. points of girls in fund was 26.3 in 1st test and 32.9 in 2nd.
The av. No. points of boys in fund. was 23.2 in 1st test and 3.05 in 2nd.
The av. No. points of girls in fund. was 26.3 in 1st test and 32.9 in 2nd.
The av. No. points of boys in reasoning was 21.7 in 1st test and 27.9 in 2nd.
The av. No. points of girls in reasoning was 20.39 in 1st test and 24.6 in 2nd.
In fundamentals the boys made a gain of 30 per cent.
In fundamentals the girls made a gain of 25 per cent.
In reasoning the boys made a gain of 25 per cent.
In reasoning the girls made a gain of 21 per cent.
In the addition problems the boys made a gain of 18 per cent.
In the addition problems the girls made a gain of 14 per cent.
In multiplication the boys made a gain of 28 per cent.
In multiplication the girls made a gain of 23 per cent.
The boys made a gain of 21 per cent. more in fundamentals than the girls.
The boys made a gain of 22 per cent. more in reasoning than the girls.
The boys made a gain of 30 per cent. more in addition than the girls.
The boys made a gain of 24 per cent more in multiplication than the girls.

The following table gives the medians and average deviations of each group for each grade in the fundamental tests. "1" indicates first test, and "11," indicates the second test.

| | 1 Med. | 1. Av. Dev. | 11. Med. | 11 Av. Dev. |
|---|---|---|---|---|
| 6th Drill..... | 21.5 | 4.58 | 29.5 | 4.92 |
| 6th Non-drill..... | 19 | 4.61 | 31 | 4.07 |
| 7th Drill..... | 23 | 3.33 | 28 | 4.44 |
| 7th Non-drill..... | 23.5 | 4.20 | 27.5 | 4.40 |
| 8th Drill..... | 27 | 4.31 | 34 | 7.62 |
| 8th Non-drill..... | 31 | 5.33 | 35 | 5.08 |
| All Drill..... | 24.5 | 5.28 | 30 | 6.35 |
| All Non-drill..... | 25 | 6.40 | 31 | 5.71 |

The median as here used expresses the central tendency. It is more easily found than the average grade, and is less likely to be affected by errors and chance results. The average deviation was found from the median, and denotes the variation from uniformity.

In concluding, special attention might be called to some of the data and the tendencies noted.

1. There is a substantial increase in abilities of both drill and non-drill groups during the two months between the tests. Only five pupils made a less grade in fundamentals in the second test than they did in the first. Fifteen made a smaller score in the reasoning problems.

2. The drill group made a much better gain than the non-drill group, being 15 per cent. better in fundamentals, 50 per cent. better in the reasoning tests, and 31 per cent. better in the combined tests.

3. The median increased in the second test in all groups tested, the increase varying from 12.9 per cent. to 63.2 per cent.

4. The average deviation was usually greater in the second test than in the first test, there being, however, less deviation in the non-drill groups.

5. The coefficient of variability is quite generally less in the second test than in the first test. This may mean that teaching tends to produce type forms, or that a given grade, or a given school tends to assume a standard of attainments. Here is a good problem for further investigation.

6. The girls did better than the boys in the test in fundamentals.

7. The boys did better than the girls in the tests in reasoning abilities.

8. The boys made a better gain during the time between the tests than did the girls, in all lines of work, the gain being about 24 per cent. over that of the girls.

# EDUCATIONAL PSYCHOLOGY AT THE CLEVELAND MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION.

BIRD T. BALDWIN,

*Swarthmore College.*

Of the fifty-seven papers on the program of the last session of the American Psychological Association and its joint meetings held at Cleveland, December 30 to January 1, at least a score or more have a specific bearing on educational psychology and experimental education. For convenience of discussion the papers may be grouped around the problems in *general psychology,* including among other subjects that of *Ideo-motor action* by President Thorndike, *Behavior as a psychological category* by Angell, *Heredity* by Cattell, and *Physiological psychology* by Dearborn (G. V. N.); *religious psychology,* including papers by Leuba and Krueger on *magic* and *religion; abnormal psychology,* including discussions by Aikens on *amnesia,* Southerd on *Structure versus function in psychopathology,* and the *Psycho-physiological effects of a prolonged fast* by Langfeld; *animal psychology,* including experimental studies in *Delayed reactions* by Hunter, *Reactions to a temporal series of stimuli* by Gregg and McPheeters, *Sound discrimination* by Shepherd (W. T.), *Vision* by Tugman and Haggerty, *Instinct* by Shepard (J. F.) and Breed, *General intelligence* by Yerkes and Bassett; and *Educational psychology,* including psychological tests for evaluating stages of mental development or progress in economy of learning in crminal women, delinquent girls, feeble-minded children, normal children and adolescents; tests in writing and tachistoscopic reading; reactions in methods of measuring association time; standards of mental efficiency, general mental tests, and the reliability of school grades; and Stoelting's exhibits of psychological apparatus and tests.

The papers in general psychology by Thorndike and Angell will have a marked influence on the presuppositions and categories of educational psychology. The former sets forth in a forecful and lucid manner the thesis that "experimentally ideas of acts do not *per se* produce them." The theory of ideo-motor action as held at present by the majority of psychologists is a relic of teleological thinking and is a direct descendant and homologue of primitive man's belief in a sympathetic magic. The latter writer maintains, with equal clearness, but without special experimental data, that "theoretically it should be possible to state differences of mental condition in terms of overt behavior." While the fallacies of the introspective method differ little in kind from those of other sciences the tendency to discount this method is a wholesome one "in so far as it looks toward the betterment of methodological procedure. It is unprofitable as it proposes to do away with resort to introspection."

In his elaborate paper on "*Families of american men of science,* Cattell makes a distinct contribution to the study of heredity, giving eighteen detailed tables in which he shows, among other results, that of the 917 families listed 660.5 are of American parentage. In the occupations of the fathers of the scientific men professional men rank first (43 per cent.), including in the following order—clergymen, teachers, physicians, lawyers and other professions. The average age of cians, and lawyers. The average age of marriage for the father was 27.9 years, for the mother 22.8 years. The fathers were on an average 34.9 years old at the birth of the sons and the mothers 29.7 years. There is a tendency for both the wives and men of science to marry a little later than their parents, and to have, on the average, smaller families; the families from which scientific men come have on the average 4.64 children, and married scientific men whose families are complete have on an average 2.22 children. The central theme of this paper furnished a discussion of the causes and effects of decreasing birth rates and death rates and the influence of heredity and opportunity in determining scientific advancement. Space will not permit, at this time, a discussion of the papers on religion and magic, the *Study of man* by Ladd, nor the *Rela-*

*tion between the anschaulich and the unanschaulich contents of consciousness* and the *Functions of a visual image in memory and imagination* by Martin. Neither will it be possible to do more than to mention in this communication the papers on *imagery* by Ogden and by Fernald, nor the work in *vision* experiments by Ferree, by Geissler and by Adams, all of which furnish data that the educational psychologist will necessarily be required to take into consideration in his analysis of the elements of consciousness and the process of learning. Meyer, on the frequently recurring problem of *left-handedness,* defends the thesis that during the first few months of life left-handedness is a necessary accompaniment of right-handedness of adult life, the change occurring approximately between the sixth and fifteenth months, during which there is a period of ambidexterity. This is explained (on *a priori* grounds) by the fact that left-handedness in the infant seems to have its neurological basis similar to that of right-handedness in the adult.

The papers on animal psychology will make an important contribution to this important field of psychology, and, while several of the papers will throw light on the nature of learning in animals, and therefore *probably* in children, the two which impress the writer as being of particular significance to teachers are those of Hunter on *Delayed reactions in animals and children* and the *Relative effects of maturation and use on the deevlopment of an instinct* by Shepard (J. F.) and maturation. Practice was prevented by confinement in representative function in the behavior of animals and children. He found, by means of a series of control tests with rats, dogs, raccoons and children, that in successful responses some guiding cues must be developed within the subjects' bodies. While the behavior of cats and dogs can be stated in terms of habit, the raccoons require an ideational function whose content may be either sensory or imaginal, according to one's general theory of consciousness. The maximal delays of the reagents were: rats 6″-9′; dogs 15″-5′; raccoons 15″-30″; children 50″-20′. Shepard and Breed observed "the pecking instinct of chicks" and constructed for a standard, a curve of development showing the "improvement in accuracy of the pecking co-ordination from birth to the twenty-fifth day." An

attempt was then made to determine, by testing twenty-three chicks, the relative contribution to the improvement by use and maturation. Practice was presented by confinement in a dark room, the chicks being fed artifically. "The most interesting features of the results are the equally poor initial records of the chicks and the rapidity with which they attained the normal level of accuracy. We may accordingly regard the first two days of the curves as the necessary practice component and the remainder a record of maturation."

Experimental educational psychology is rapidly acquiring a more definite scope and refinement of methods of procedure. Since the remaining papers belong primarily in this field they will be of particular interest to the readers of THE JOURNAL. Monroe finds, after testing three hundred girls and three hundred boys between the ages of three and six years in matching and naming the six standard colors in the Binet test, that from three to six the girls excel the boys in color perception tests, except at the age of five, and in the color naming tests the girls excel the boys at all ages. In regard to the Binet tests the sex differences are not so marked, the girls leading the boys in the third year and in the seventh year, and the boys leading the girls in the fifth year. On retesting 82 children by the Binet tests (1911 revision) after an interval of one year, Berry concludes there is an average gain in rank of one year, with an average deviation of .26 of a year for normal children, with a gain of .96 of a year for those who tested below normal age, 1.02 for those at age and 1.17 years for those above age. Of the 40 mental defectives the average gain was .5 of a year with a deviation of .31 of a year, with an individual variation of a loss of .6 of a year to a gain of 1.2 years. He finds a close correlation with the results of the original tests and the "average gain of the normal children who tested above age, in 1911, was 20 per cent. greater than that of the children who tested below age in 1911; that the average gain for the defectives of 15 and under was 50 per cent. greater than for those above that age." Goddard discovers, after three annual testings of 352 feeble-minded children, that 109 remain absolutely the same, 232 have not varied more than two points in the two years and twenty-two

have gained more than five points—that is more than one year in two years. Of the 2000 public school children 464 have been retested three times, and of these 49 per cent. make normal or more than normal progress—five points per year; 47.2 per cent. make approximately one-half normal progress; 1.25 per cent. make no progress. These facts, the speaker claims, are strong evidence that "the scale in the hands of a trained person is thoroughly reliable." This optimistic viewpoint is vigorously challenged by Weidensall in her paper on *Psychological tests applied to criminal women,* and the writer deeply regrets that no abstract of her paper has been obtainable.

In a very comprehensive *Report of a series of tests administered to 800 fourteen-year-old children,* Woolley and Fischer make the following generalizations on children leaving school to go to work: the girls are superior to the boys in height, weight, and perfection of co-ordination, while the boys are superior to the girls in strength, rapidity of motion, and vital capacity; the girls are somewhat superior to the boys in all the mental tests; the tests of physical development show a slight correlation with grade, and the tests of mental ability a more marked correlation. Jones tested delinquent girls for the purpose of determining their educability. The five series of tests represented types of association of controlled association, the form-board, crossing out A's and rapid naming of words. The results show it is possible to make a classification of the subjects which, the writer optimistically concludes, "seemed fully as accurate as the results obtained by applying the Binet scale. It is far more easily and more rapidly applied with just as good results." B. T. Baldwin's paper is a comparative study of *The progress of learning of adolescent delinquent white and negro girls* as shown by a wig-wag code adapted for this purpose and applied for sixteen consecutive days. He finds this type of material furnishes a very reliable means for evaluating learning capacity irrespective of school standing for children who can read. The 76 practice curves show a wide range of individual differences and significant periods of acceleration and retrogression. As a group, the negro girls are inferior to the white girls; they accomplish less work, are less accurate, less easily enthused

and are more controlled by moods. In a *Pictorial completion test* Healy describes a picture type of form-board from which parts are cut, these parts to be replaced by the examinee. With individuals above nine years of age the ability to complete these spaces varies little among those of the same grade of mental ability; below nine years of age, and for the group below fair or ordinary ability, the type and number of final errors rapidly changes. Schmitt tested 150 normal children with five tests described in Healy and Fernald's monograph. The results indicate that the child's ability to deal successfully with abstractions of representative material is deevloped somewhat earlier than his ability to deal in a planned way with the functional necessities in concrete material. The papers given by Pyle will apear in full in this JOURNAL.

School subjects received little attention at these meetings, but Freeman's paper called atention to the *Need of a dual standard in testing handwriting,* since it is not only essential to test the quality and speed of writing on account of their practical importance, but also on account of variations which are found in different school grades in the same school, in the same grade at different times of the year, and in different schools or individuals when compared with one another. *Individual differences in the attention fixated during reading and a comparison of differences in types of reaction* furnished the subject of Pinter's investigation. It was found "observers could be classified according as they tended to fixate sharply or to let their attention fluctuate, and characteristic differences of the manner of reading resulted from these different forms of attention." Children tend, in most cases, toward the fluctuating type. There are sensory, motor and natural types of reactors, and the mean variation of the first two is comparatively small when compared with the latter; the fluctuating reader approximates to the type of natural reactor and allows his attention to wander between the stimulus and the reaction, while the fixating reader fixates either the stimulus or the reaction.

In his work on the *Reliability and distribution of grades* Starch calls attention to the problem of "How small steps are distinguished and what proportion of persons should

ordinarily receive the various grades." The former depends on the reliability of the assignment of grades, and was determined by having two papers in English graded by 142 teachers, and one in geometry by 118 teachers. A very wide variation was found, ranging from a mark of 28 to 92 in the case of the geometry paper. In order to test the factor of different standards in different schools, ten freshman English papers were graded by ten English instructors in the same institution "with a mean variation of 5.3 which is not materially different from the above variation." The individual standards in marking were then eliminated through a system of weighting and a comparison made with the accuracy of measurement in another field.

Though there is a strong tendency for educational psychology to differentiate its field more and more from general psychology of the introspective and philosophical type, the writer believes it is neither possible nor desirable to try to formulate or teach educational psychology without a substantial background in the science which is the source of our data and methods. General psychology furnishes the substratum on which we must build, with equal detail of experimental procedure, the new sciences of educational psychology and experimental education.

# COMMUNICATIONS AND DISCUSSIONS.

## EDUCATION IN THE MIDDLE WEST.

A Conference of Professors of Education of the Middle West Universities and Colleges met at Lincoln, Nebraska, on Thursday, Friday and Saturday, December 19, 20, and 21. The meeting was well attended, twenty-five representatives being present from the schools of eight States. The program consisted of papers and discussions upon a variety of subjects. The principal numbers upon the program were the following:

"Does the Present Undergraduate Course in Education Accomplish Its Purpose in Training Teachers?" by Professor W. A. Jessup, University of Iowa.

"A College Graduate Teachers' Certificate Valid Throughout the Middle West," by Professor J. O. Craeger, University of Wyoming.

"The Vitality of Teaching," by Professor W. M. Jones, University of South Dakota.

"What Has Been Done Along These Lines Up-To-Date," by Professor B. E. McProud, Nebraska Wesleyan University.

"School Observation; What It Should Seek to Accomplish; How to Administer It," by Professor Frank E. Thompson, University of Colorado.

"Aim of Practice Teaching, and What It Is Accomplishing," by Professor Charles Fordyce, University of Nebraska.

"Practice Teaching; Its Administration in the University," by Professor J. L. Meriam, University of Missouri.

The first meeting, held on Thursday evening, was very informal. In the absence of Professor Foster, who had arranged the Conference, Dean Charles Fordyce, University of Nebraska, presided. Professor J. O. Craeger led in a discussion of the possibility of providing a college graduate teachers' certificate valid throughout the Middle West. The extreme inconvenience of the present lack of recognition by one state of college diplomas or of certificates issued in other states was pointed out and statistics were presented showing in detail the exact situation throughout the country. Professor Craeger laid emphasis upon the necessity of concerted action in this matter, both by the schools of education and by the state departments throughout the Middle West. However, attention was directed to the fact that no action upon this matter should be permitted to lower the average standard of qualifications demanded of teachers. On the contrary, any action taken should be such as tends to raise both

the average standard of qualifications and the average efficiency of teachers.

The second number of the evening was a general discussion, led by Professor Jessup of Iowa upon the subject of the Present Typical Undergraduate Course in Education. Professor Jessup raised a number of interesting questions, among them the following: Does the customary course in the history of education aid the teacher in her actual work in the school room? Might it not better be replaced by a course upon present-day problems with particular reference to high schools? In how far is practice teaching in a training school beneficial to the prospective high-school teacher? Is such practice-teaching more successful when done in a city high school or when done in an experimental or model school provided for that purpose by the university or college? It was pointed out that the advantage of training in a city high school consists mainly in the fact that conditions there are frequently more nearly normal than in the experimental or model school; usually, also, the equipment is better in city schools as respects gymnasiums, laboratories and libraries. On the other hand, practice-teaching in a high school is frequently unsuccessful because of the lack of full authority on the part of the University or college. Complications and misunderstandings involving the authorities of the University and high school are likely to arise. In general the concensus of opinion was that practice-teaching is highly beneficial to the prospective teacher, but that the specific arrangements of any school must depend upon local conditions. It was further suggested by Professor Jessup that arrangements might be made with the principals of large high schools whereby picked graduates from the University should be granted teaching fellowships paying two or three hundred dollars. According to this plan, recent graduates, during a fifth year, would spend two or three hours daily in actual teaching in a large high school under the supervision of the principal. This work would be counted toward the Master's degree and would in many respects resemble the *Probejahr* of the German system. Finally Professor Jessup called attention to the fact that training of teachers should be such as to meet the needs of the few men who at present choose this work either permanently or temporarily.

Friday morning was devoted chiefly to visiting the practice school of the University of Nebraska. Demonstration classes were held in a variety of subjects and the actual work of the training school

was inspected in detail by the visitors. At the regular meeting of the Conference held at 11:00 o'clock, Professor H. H. Foster of Ottawa University was chosen chairman and C. H. Williams of the University of Colorado secretary. At this meeting a paper was read by Professor W. M. Jones of the University of South Dakota upon the subject of The Vitality of Teaching. In this he emphasized especially the need of appealing to the fundamental interests of the child. Motivation was discussed in detail, particularly in relation to the development of the sense of right and wrong. A second paper was read by Professor B. E. McProud of Nebraska Wesleyan University upon the subject *What Has Been Done Along These Lines Up-To-Date.* The paper consisted of an historical account of the development of the undergraduate course in education and the establishment of practice schools both in the United States and in foreign countries, with particular reference to France and Germany.

At the afternoon session Professor Frank E. Thompson of the University of Colorado discussed at considerable length the question of school observation and what it should seek to accomplish. In opposition to opinions expressed earlier in the meeting by some members, he supported the contention that observation and actual teaching should always go together. Nelther can accomplish its best results unless constantly tested by reference to the other. Especially does actual practice on the part of the student prevent too close imitation of the methods of the model teacher. It was suggested by Professor Thompson that the observer should always be required to prepare, before visiting the recitation, a plan for that particular lesson, correcting and amending it after the recitation by reference to the actual work of the expert teacher observed. In addition to this the observer should be required, after the recitation, to prepare a second lesson plan intended to accomplish the same results arrived at by the expert teacher in another and different way. It is more important according to this view for the observer to watch the children than to watch the teacher. The important questions for the observer should be: have the children aims in the recitation: do they realize their aims; and if so, how? Then, secondly, how does the teacher aid the children in those aims. After a number of observation lessons the student-teacher should make a careful analysis, first, of her own personality as compared with the personality of the teacher observed; second, of her own scholarship as adapted to the aims involved in the recitation; and third, of her own technique as compared with the technique of the expert. For such an analysis,

actual practice in connection with observation is absolutely essential.

At the evening meeting on Friday, two very interesting discussions were presented, one by Professor J. L. Meriam of the University of Missouri, giving an account of his experience in practice teaching at that institution, and second, a paper by Dean Fordyce setting forth the essential points in practice-teaching as his experience led him to see them. First of all in importance, according to Dean Fordyce, is the aim in the recitation on the part both of the teacher and of the pupil. This aim should be apparent to an observer without any previous knowledge of the plan actually prepared by the teacher. Second in importance is the character of the questions asked by the teacher. These should be such as to stimulate thought and lead the pupil beyond the book in his desire to understand the subject. Finally, emphasis was placed upon the fact that good methods are far more essential in high-school work than in the University or college, owing to the immaturity of the pupils. In the discussion of observation, Dean Fordyce called attention to the need of constant suggestions by the supervisor or expert observer. At first the new teacher does not see in the recitation the points which she ought to see, and it is largely through competent direction that this capability is acquired. Attention was also called to the fact that observation of a number of expert teachers is highly desirable in order to avoid too exact imitation of the methods of any one teacher.

By way of summary it may be said that the chief conclusion of the various discussions appeared to be that in the past too rigid adherence has been given to formal method to the detriment of the development of the personality of live teachers. This development may be promoted first by a study of live problems, and second, by means of actual practice and observation of good methods by prospective teachers. The importance of neither of these elements can be overestimated.

The conference was a most successful one, great interest being manifested in every meeting. This success was due in no small part to the informal nature of the discussions, questions and suggestions being constantly in order.

At the close of the session it was voted to thank Professor H. H. Foster for the great interest which he as first president of the organization had manifested in the arrangement of the program, and also to thank the authorities of the University of Nebraska for the use of its buildings and for its hospitable entertainment. The

next meeting will be held in December, 1913, at Omaha, Nebraska, the exact date to be arranged later. Dean Charles Fordyce of the University of Nebraska was elected President for the ensuing year.

C. H. WILLIAMS.

University of Colorado.

## WHAT A STUDENT OF ELEMENTARY PSYCHOLOGY SHOULD BE TAUGHT CONCERNING THE FUNCTIONS OF THE NERVOUS SYSTEM.[1]

1. The enormous complexity of the neuro-musculo-glandular mechanism and process, homologus to the indescribably complex mental stream.
2. The utter inadequacy of central and axial localization to explain the actually experienced facts, mental or bodily.
3. That the nervous system functionally is a fabric with separate pathways of fibers only for anatomic safety, etc.
4. That the sole function of the nervous system, secondary phylenically to muscle, is to conduct impulses as the means to coördination.
5. The unified duality in the nervous system of vegetative (actuating, racial, autonomic, habitual, subconscious) and personal (inhibitory, individual, cortical, deliberate, new, and conscious).
6. The hierarchy of the nervous circuits, each including and more or less dominating those below it and influencing those above it.
7. The universality of cenesthetic influence into the central nervous system from the universally tonic or moving body, these influences of exciting energy constituting the reservoir from which all nerve-energy is drawn.
8. All possible detail that is agreed upon concerning the structure and action of the nervous system, and much more of the physiology of the effector mechanism than the average student learns.
9. That the nature of the nervous energy is still unknown (as is the nature of mental "energy"), and therefore that the purely metaphorical notion of "traces" in the nervous matter should be abandoned as misleading, a notion of sets of kinetic influences being substituted.
10. Above all, that it is better to know a few general trends or principles of action of the neuro-musculo-glandular fabric than to pretend an understanding not to be had from a relatively few unrelated, isolated, and uncertain facts of structure.

GEORGE V. N. DEARBORN.

Tufts Medical and Dental Schools.

[1]Author's abstract of a paper scheduled to be read at the Cleveland meeting of the American Psychological Association.

# THE
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## EDITORIALS.

**THE SCHOOL PSYCHOLOGIST IN LONDON.**

The creation of the post of "psychologist to the Education Department of the London County Council" deserves more than passing notice, because it is, we may hope, the entering wedge that will serve in time to introduce the practical psychologist into many other school systems, not only in England, but in other countries. For the present the London appointee, Mr. Cyril Burt, of the University of Liverpool, well known for his research in differential and correlational psychology, is to serve on half-time only, and his duties primarily concern the detection, examination and instruction of subnormal children—this because the present system of detection and examination by teachers and school physicians has proved so distinctly unsatisfactory that the appointment of a school psychologist was shown to be financially and administratively worth while. We hope that Mr. Burt's work will convince the educational authorities at London that a school psychologist can undertake with advantage to the schools a much wider field of investigation than that which is now assigned to him, and that eventually London will have the honor of establishing a real bureau of research in educational psychology.

G. M. W.

**MENTAL NODES.**

Are there such things as mental nodes,—critical or turning points in mental development? Does mental growth take place by mutations? Does the course of mental activity maintain the same level for a time until a certain head or pressure of potential energy has been accumulated, then suddenly surge to a higher level? Or does mental development take place smoothly and gradually by infinitesimal changes, no one of which can be detected separately, but which in the aggregate manifest increased efficiency? By analogy with biological processes recently brought to light the mutation theory might be expected to hold of mental development as well as of physical evolution.

The adolescent period has been hailed as such a critical turning point in mental growth, and we have a vast literature emphasizing the profound change in mental outlook which characterizes this age. The rapid changes in physical development at adolescence are said to have their mental counterpart in a complete disorganization of the old mental habits and attitudes, in an intensification of emotional tone, and in the development of new standards of judgment and reasoning. It is possible that this view is correct, and that adolescence involves the opening up of a new life, but in spite of the amount that has been written on the subject it must be admitted that we have very little accurate knowledge of the mental status of the adolescent. Most of the literature is highly imaginative, and is based either on reminiscences of the writer or on questionnaire data involving reminiscences of those who fill out the blanks. Actual studies of pre-adolescent, adolescent, and post-adolescent individuals, or of the same individuals throughout this whole period, are few and the results offer little evidence of cataclysmic mental change.

Now comes Professor Judd with the theory that the end of the fourth grade marks another mental node,—that the habits and modes of thought developed in infancy and early childhood here begin to break up and give way to a larger outlook upon life and a higher and more complex organization of experience. Evidence for this view is adduced from studies of retardation, of handwriting and of arithmetic. Whether there is any such general mental change at any particular period of life is an open question. At any rate we are in hearty sympathy with Professor Judd in the plea for more careful and extended studies of mental development in each of the elementary school subjects.

J. C. B.

## NOTES AND NEWS.

In the issue of *Science* for December 20, 1912, Mr. William Kent, in the course of a discussion of "Academic Efficiency," suggests an educational experiment which should be given wide publicity in the hope of arousing discussion and perhaps inducing some man or group of men to undertake the investigation. The experiment would require ten years of time and perhaps half a million dollars, but, in view of the importance of the question, the amount would be well spent. The suggestion involves the appointment of a commission of five members, who would spend all of the first year investigating actual educational conditions in this country. They should then report on what should be the course of a boy between the ages of fourteen and eighteen (1) if he intends to go to work at eighteen, (2) if he intends to enter a general college, (3) if he intends to enter a technical school. "The second year the experiment is to be begun. Select a hundred boys who are ready to enter high school, of a majority of whom there is a reasonable probability that they will, if they prove fitted for it at eighteen, take a college course. Rent a preparatory school, or a portion of one, and have the boys taught, by selected teachers, in the courses laid down by the commission. Provide enough tutors or preceptors to insure that the education of the boys is properly supervised and that their time is not wasted. Continue their high-school education, for as many of them as stay in school, for four years. During all this time the commissioners are to be studying the methods of high-school teaching, and the methods of measuring the efficiency of teaching, preparing practical standards of examination, not merely to test the memory of scholars, as in ordinary examinations, but to test their mental and bodily powers. Find out not only what the boys know, as a mere act of memory, but what and how they think, and what they can actually do. Test not only the hundred boys, or as many of them as remain, but also boys in other high schools, by the same standards or by other standards that may be proposed by the high-school teachers. Cultivate the same spirit of emulation for success in scholarship that now exists

for success in the athletic field, but give them enough athletics and other recreation to develop their bodies as well as their minds. Train them also in hygiene, in morals and in manners, to make them not only scholars, but gentlemen.

"During these four years the commissioners are also studying college administration, courses, methods of teaching and efficiency, and determining standards of measuring efficiency. When the boys are through their preparatory course of four years, send them to such colleges as have been selected for them, have them take the courses for which they are fitted, provide tutors for them and watch their progress through the college, testing them by predetermined standards in comparison with other college students. At the end of the four-year college courses the commission is to report on the whole eight years' experiment. It will be found that many mistakes have been made, but probably not so many as would be made in an ordinary eight years' course of high school and college. The success of the experiment is not to be judged by the success of these selected boys, but by the value of the information obtained and reported on by the commissioners as to the various methods of teaching and of college administration and by the acquirement of standards by which academic efficiency may be measured in the future.

"During the whole of the eight years' experiment the boys should be required to keep a diary in which they record what seem to be the most important items concerning their education, and they should once a year present to the commissioners a written report of their progress, keeping a copy for their own future use. Four years after they have graduated from college, when their minds are sufficiently mature, they should be asked to write critical reports of their educational career as it then appears to them. A study of these reports by the commission, which should be continued in existence for that purpose, would no doubt furnish fruitful ideas for further educational progress."

In connection with the editorial in the January issue of this JOURNAL on the need for supervision of play and playground, it is interesting to note that the city of Philadelphia has absolutely refused to permit children to play save under supervision, and that the emphasis is laid on securing proper supervision of play rather than on large playgrounds or on complete equipment.

The New York Branch of the American Psychological Association held its regular monthly meetings on February 24. The address of the afternoon meeting was delivered by Prof. John B. Watson of Johns Hopkins University on "Psychology as the Behaviorist Views It." This is the first of a series of eight lectures on Animal Psychology to be delivered by Professor Watson as non-resident lecturer at Columbia University.

Professor Watson presented the view that psychology as the science of consciousness had not made good its claim as a natural science. As long as introspection is the method to be relied upon, there is bound to be disagreement as to results, and there can be no hope of settling the differences of opinion. If psychology is to achieve scientific results it must become objective. It must leave the question of consciousness to metaphysics and take as its field that of behavior. Behaviorism is the only consistent functionalism. As the science of behavior, psychology could establish its claim to be a science.

At the evening session at the American Museum of Natural History the following program was presented:

Mr. D. O. Lyon—Illusions and Hallucinations in Insanity.

Dr. F. Lyman Wells—A Note on the Retention of Practice.

Mr. C. M. Sax—Painting and the Learning Process.

Prof. C. C. Trowbridge—(1) Methods of Orientation and Imaginary Maps. (2) The Probable Explanation of Certain Flock Formations of Birds.

The editors and publishers of the Zeitschrift für pädagogische Psychologie und experimentelle Pädagogik have established a series of monographs entitled *Pädagogisch-Psychologisches Forschungen*. The object of this series is to present the results of experimental and statistical investigations in education which are too elaborate for publication as articles in the journal. The publications will deal with the anthropological and biological as well as the psychological aspects of paidology, and will include studies in the essentials of the teaching process. Numbers already announced are: N. Kraemer, *Experimentelle Untersuchungen zur Erkenntnis des Lernprozesses;* Fr. Müller, *Aesthetisches und ausseraesthetisches Urteilen des Kindes bei der Betrachtung von Bildwerken;* and G. Dehning, *Bilderunterricht*. The series is published by Quelle & Meyer, Leipzig.

Provision has been made by the school authorities of the city of Dresden, Germany, for experimental classes in elementary schools. These classes are to have the same number of pupils as the regular classes, but are to remain for three years under the same teacher. The widest latitude is allowed the teacher in the choice of course of study, materials and methods. This is an important step in the direction of the scientific study of school practices, and is to be commended to the consideration of progressive American superintendents.

The city of Hamburg has opened an institute for experimental psychology and pedagogy under the direction of Prof. E. Meumann. The institute is comfortably housed in a large twelve-room building, and in addition to the laboratory rooms will contain a library and a psycho-pedagogical museum, in which visitors may themselves try typical experiments as described in printed directions. Professor Meumann is also perfecting the plans for an International Institute of Paidology in Hamburg.

Prof. Clayton C. Kohl has resumed his work in the Department of Education at Mount Holyoke College after a sojourn of several months in Germany. Professor Kohl paid special attention while in Europe to instruction in elementary schools and to the professional activities of the various teachers' societies, especially of the *Lehrerverein* at Leipzig.

At the annual public meeting of the Women's Club of Buffalo, N. Y., on the 10th of February, Professor Whipple of Cornell University delivered an address upon "The Problem of the Subnormal and of the Supernormal Child."

W. S. Learned, Ph.D. (Harvard), is conducting a series of psychological and pedagogical investigations in the public schools of Newton, Mass. Among the researches under way are the amplification of the Courtis arithmetic tests, the trial of the Hillegas tests of English composition, the feasibility of bridging the gap between the elementary and the secondary school, and an analysis of mental, social and moral traits that will assist teachers in the characterization and understanding of individual pupils. The initiation of this type of work adds one more feather in the cap of Superintendent Spaulding,

who already has the reputation of administering one of the finest school systems in the United States.

Addresses were recently delivered before the Brooklyn Training School for Teachers by Prof. Lightner Witmer of the University of Pennsylvania on "The Treatment of Gifted Children in the Schools," and on "The Montessori System," and by Dr. Walter E. Fernald, superintendent of the Massachusetts School for the Feeble-Minded, on "Sense Training and Motor Training in the Education of Young Children."

## CURRENT PERIODICALS.

*(In this section only such articles will be noticed as bear directly or indirectly upon the interests of this Journal.)*

SCHOOL REVIEW. Vol. XXI, No. 1, January, 1913. JAMES ROWLAND ANGELL. *The Duplication of School Work by the College.* 1-10. A preliminary paper on the relations between the high school and the college. The college should be extremely careful in its elementary courses not to try to do over again the work that could and should be done by the high school.

CHARLES H. JUDD. *The Meaning of Secondary Education.* 11-25. The author points out the duplication and waste in the articulation of elementary and high schools, and shows the deadening effect of this thoughtless repetition upon the interest of the pupils.

WILLIAM R. PRINCE. *The Second Year of a Modern Language.* 26-38. A stimulating discussion of devices for energizing the linguistic life of the pupil in connection with modern language work.

FRANKLIN W. JOHNSON. *The Hillegas-Thorndike Scale for Measurement of Quality in English Composition by Young people.* 30-49. A trial of the scale with actual compositions of young people reveals several defects: (1) There is wide variation in the ranking given to individual specimens by different judges; (2) the specimens of the scale give no evidence of originality of thought. They are, therefore, not representative; (3) form and thought content should be estimated separately.

TEACHERS' COLLEGE RECORD. Vol. XIII, No. 4, September, 1912. MILO B. HILLEGAS. *A Scale for the Measurement of Quality in English Composition by Young People.* Pp. 54. Contains a complete description of the methods used in deriving the scale, the scale itself, and a discussion of the qualifications of the judges on whose estimates the scale was constructed.

No. 5, November, 1912. DAVID EUGENE SMITH, and others. *Number Games and Number Rhymes.* Pp. 111. The most complete and elaborate attempt yet made to enable the teacher to take full advantage of the play spirit in the work in mathematics. Every teacher of mathematics will find it a valuable resource.

ZEITSCHRIFT FUER PAEDAGOGISCHE PSYCHOLOGIE UND EXPERIMENTELLE PAEDAGOGIK. Vol. XIII, No. 10.

MORITZ SCHEINERT. *On the Maintenance of Discipline.—A Contribution to the Psychology of the Teaching Profession.* 500-507. A psychological analysis of the relations between teacher and pupils which make for or against good discipline.

ALOYS FISCHER. *Concerning Laziness,—A Psychological Analysis.* 507-516, 545-561. The summary treatment of laziness as a pathological phenomenon is too easy a disposition of the problem, and does violence to the common significance of the term. The author defines it as a habitual weakness of voluntary attention, and distinguishes two types, one in which the movement of attention is dull, heavy and obstructed, the other in which there is an extreme instability of attention. While native constitution may predispose to one or the other type, the author lays emphasis on the habitual character of the defect, and finds its treatment in the establishment of corrective habits.

E. MEUMANN AND R. H. GOLDSCHMIDT. *Suggestions for Practical Investigations in Paidology and Experimental Pedagogy.* 516-521. The outline of a program for the extension and popularizing of experimental and statistical studies of children.

MAX BRAHN. *The Psychology of a Mathematical Prodigy.* 529-533. Calls attention to the detailed study of the memory of a distinguished mathematician to be found in G. E. Müller's "*Zur Analyse der Gedächtnistätigkeit und des Vorstellungsverlaufs.*"

No. 11. MAX HENTSCHEL. *Memory Span.* 562-579. Tests of school children with series of consonants indicate that weak intelligence is always accompanied by short memory span. The author finds this relation so constant that he considers it one of the most important tests of intelligence. The differences in memory span among school children are so pronounced as to call for a differentiation of courses of study to take account of individual characteristics.

H. W. WITTHOEFT. *A Preliminary Statistical Study of the School Records of Elementary Pupils.* 597-623. An elaborate study of the record books of 96 Hamburg "*Volksschule*" pupils that left school during the year 1910 leads to a severe criticism of the course of study.

ERNST MEUMANN. *Suggestions for Practical Investigations in Paidology and Experimental Pedagogy. A. Problems Connected with Tests of Intelligence.* 623-638. A historical discussion of the Binet tests and a brief mention of some of the criticisms and suggested modifications which they have received.

## PUBLICATIONS RECEIVED.

*(Notice in this section does not preclude a more extended review.)*

ETIENNE BURNET. *Microbes and Toxins.* New York: G. P. Putnam's Sons, 1912. Pp. xvi, 316. $2 net.

With the marvelous advances that are now being made in the control of typhoid fever and other noxious diseases by serum inoculation there comes a demand from the intelligent public to know more about the nature of these infections and modern methods of combating them. The present book, written by a member of the Pasteur Institute, in Paris, presents the latest discoveries of science in a simple and readable form. As knowledge is the foundation of hygiene, this book should be widely read and thoughtfully digested.

MABEL CARNEY. *Country Life and the Country School.* Chicago: Row, Peterson & Co., 1912. Pp. xii, 405.

This is one of the many books dealing with the vital educational problem which centers in the conservation and improvement of the ideals of rural life. The aid that it offers to the country teacher is general rather than specific, sociological rather than pedagogical. The various chapters discuss such problems as the farm home, the country church, the grange, good roads, the rural school as a social center, consolidation of rural schools, school sanitation and decoration, boys' and girls' clubs, and the like.

MAXIMILIAN P. E. GROSZMANN. *The Study of Individual Children.* Plainfield, N. J.: National Association for the Study and Education of Exceptional Children, 1912. Pp. 74.

As the sub-title tells us, this little book presents a system of records, including a complete child history, medical examinations, physio-psychological and mental tests, daily regimen and disease record. There is no doubt that more detailed child histories are greatly needed, and the questions of the present list cover almost every phase of the child's antecedents and behavior. Whether anyone but a medical man would be apt to answer them is a subject for debate. The author rejects the Binet classification of mental tests by years on the ground that no hard and fast line can be drawn between what is characteristic of one or the other chronological year of a

child's life, and adopts a classification by periods—primary, elementary, intermediate, and advanced. The tests for these periods involve much new material, including graded tests for musical ability.

W. H. Heck. *A Study of Mental Fatigue in Relation to the Daily School Program.* Lynchburg, Va.: J. P. Bell Company, 1912. Pp. 28.

The report of an experiment conducted in four New York City schools to discover the changes in efficiency manifested by pupils during a school day. As a measure of the efficiency a modification of test number seven of the Courtis Standard Tests in Arithmetic was used. The results warrant the conclusion that mental fatigue is a negligible quantity in school management, provided the children are working under proper hygienic conditions.

Arthur Holmes. *The Conservation of the Child.* Philadelphia: J. B. Lippincott Company, 1912. Pp. 345. $1.25 net.

The author, who was formerly assistant director of the psychological clinic in the University of Pennsylvania, "aims to give a practical description of the inauguration and operation of a psychological clinic." The chapters treat of the constitution, function, field and operation of the psychological clinic, the methods of classifying clinic cases, the classification of moral deviates, and the sociological relations of the clinic. The work is unquestionably the most complete and authoritative account of the psychological clinic yet published.

Harriet E. Hunt. *The Psychology of Auto-Education.* Syracuse, N. Y.: C. W. Bardeen, 1912. Pp. 82.

An attempt to connect the practice of Madam Montessori with the philosophy of Henri Bergson, as expressed in his *Creative Evolution.* Chapter I discusses auto-education from the Montessori point of view, chapter II analyzes the content of knowledge according to Bergson, chapter III considers learning and teaching from the point of view of establishing relations, and chapter IV sketches a public school system organized in accordance with the views already set forth.

Vernon L. Kellogg. *Beyond War. A Chapter in the Natural History of Man.* New York: Henry Holt & Co., 1912. Pp. x, 172. $1 net.

This delightful little book traces the natural history of man through the early geologic ages, from the time of the Great Ice, where, as an animal, he lived by his kill; through the vicissitudes of cave

life, where he combined with others to fight against groups of his own kind; through the ages of copper and bronze and iron to the highly diversified creatures of historic times. Looking at the future in the light of this long past, there is every encouragement to believe that man is rapidly becoming too rational to tolerate the waste of war.

PAUL KLAPPER. *Principles of Educational Practice.* New York: D. Appleton & Co., 1912. Pp. 425.

This is a meaty book which gives evidence of wide reading, thoughtful reflection, and ingenious focussing of data from varied fields upon the problems of educational procedure. The main topics are conventional enough,—"Education as Physiological Adjustment, as Sociological Adjustment, and as Mental Adjustment,"—but the treatment of these is in many respects original and stimulating. In his psychology the author does not stray far from James, but the wealth of detailed application to school situations makes this a book to be reckoned with by the educational psychologist.

HUGO MUENSTERBERG. *Psychologie und Wirtschaftsleben, ein Beitrag zur angewandten Experimental-Psychologie.* Leipzig: J. A. Barth, 1912. Pp. viii, 192. M. 2.80. Geb. M. 3.50.

The first serious, systematic attempt to apply the methods of experimental psychology to the problems of vocational life and to the task of selecting for a given piece of work the individuals who by nature and training are best fitted for it. The four main heads of the discussion are: I. Preliminary Questions; II. The Selection of Fitting Individuals; III. The Attainment of the Best Possible Results; and IV. Eliciting the Desired Mental Attitudes. An important contribution to applied psychology.

SAMUEL CHESTER PARKER. *A Text-Book in the History of Modern Elementary Education.* Boston: Ginn & Co., 1912. Pp. xxvi, 505.

A well written, well organized, and well illustrated book, marking in all probability a new era in the construction of texts in the field of educational history. The author has followed the principles, so successfully developed in the making of recent text-books in general history, of (1) intensive treatment of a limited field, (2) emphasis on a relatively few selected movements which are typical, (3) discussion of the chosen topics in such a concrete way as to help the student to appreciate the reality of the historical development.

WILLIAM LYON PHELPS. *Teaching in School and College.* New York: The Macmillan Company, 1912. Pp. xii, 186. $1 net.

A frank, genial, entertaining series of chats on the teaching of English literature. The author draws from a rich store of experience,

and makes many good, sensible suggestions. A more extended appreciation of the book from the standpoint of the experimental educationalist will be found in this JOURNAL, Vol. III, p. 584.

ROBERT R. RUSK. *Introduction to Experimental Education.* New York: Longmans, Green & Co., 1912. Pp. viii, 303. $1.40 net.

This is a book which has been much needed in English. Based on Meumann's *Vorlesungen zur Einführung in die experimentelle Pädagogik,* it condenses that writer's lengthy discussions into a brief compass, and focusses attention upon the work of English and American investigators in this field. We bespeak for the book a wide adoption as a text in college classes in education.

BERNHARD SCHULZ. *Psychologische Wanderungen auf Seitenwegen.* Jena: Gustav Fischer, 1913. Pp. viii, 242. M. 8.00.

In these essays on psychological subjects by an eminent physician there is a staunch advocacy of the point of view of the behaviorist. Neither interaction nor psychophysical parallelism is adaquate to account for all of the facts, but both the mental and the physical must be viewed as a unity in the behavior of the living organism.

R. SCHULZE. *Experimental Psychology and Pedagogy.* Translated by Rudolf Pintner. New York: The Macmillan Company, 1912. Pp. 365.

This book, which is extensively used by teachers in Germany, is well adapted for supplementary reading in educational psychology. It is an attempt to illustrate the various methods of experimental procedure in psychology with reference to educational aspects. There are no less than 314 illustrations. These include a rather complete series of ordinary psychological instruments. There are, for example, several illustrations of chronoscopes, many ergographs, and a variety of forms of memory apparatus. This makes interesting reading to the person who knows the psychological laboratory, but will probably be rather difficult for others to interpret. The material is classified on the basis of the Wundtian psychology. The author has drawn mainly from German sources.